

**MANUAL FOR OPERATION OF THE 4JX1 – DIESEL UBS-73**

**VERSION 3.0 31<sup>ST</sup> MARCH 2014**

UBS69 = 3.1 turbo diesel motor (4JG2) Trooper/Bighorn/Jackaroo

*UBS73= 3 turbo diesel motor (4JX1) Trooper/Bighorn/Jackaroo [4JB1-T engine will replace 4JX1]*

*Manual (whole ca) r<http://www.clubisuzu.com/>, <http://vocasupport.com/4jx1-engine/>  
[for download]*

**General:** The 4JX1 is a CAT engine, licenced engine to IZUSU

<b>Mechanics that work on the 4JX1</b>	
<b>Mechanical World on Edward St, Wagga.</b>	<b>South Coast 4wd in Wollongong.</b>
<a href="http://www.jcdiesel.com.au/">http://www.jcdiesel.com.au/</a>	
<a href="http://www.smsdiesel.com.au/contact_pages/Melbourne_contact.html">http://www.smsdiesel.com.au/contact_pages/Melbourne_contact.html</a>	SMS Diesel spares 133767
<a href="http://eng-tek.com.au/">http://eng-tek.com.au/</a>	Engine performance

**Disclaimer:** - Any brand, posters or other names mentioned are purely for general information and are not endorsed by the author/s.  
The written material largely comes from: [http://forum.australia4wd.com/index.php?/forum/60-4jx1-30-tdi/?prune\\_day=100&sort\\_by=Z-A&sort\\_key=last\\_post&topicfilter=all](http://forum.australia4wd.com/index.php?/forum/60-4jx1-30-tdi/?prune_day=100&sort_by=Z-A&sort_key=last_post&topicfilter=all) Not all contributors are noted.



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## 1. Overall operation of the 4JX1 Engine:

### *Suggested Actions for Owners [Injector Article written by Red-one]*

- *Ensure the correct type and grade of oil is being used in the engine. Correct operation of every part of the injector oil circuit is critical to the successful operation of this engine. The piston within the injector has to move exactly the correct distance to deliver the correct quantity of fuel, and operate at exactly the right moment in the engine cycle, for the engine to run correctly. Selection of a good quality oil, of suitable viscosity, clearly plays a vital part in this.*
  - *Check sump oil level regularly (at least once per week), and be aware that a rising oil level could be the start of other problems.*
  - *Keep a wary eye open for fluid loss or leaks such as oil leaks from engine seals, or the smell of diesel in the coolant.*
  - *Holden Jackaroo owners - contact Holden and enquire whether the Campaign 03-H-03 has been done on your vehicle. Note this Campaign relates to the injector sleeve sealing O-rings, which according Holden : “can deteriorate and cause fuel to leak into the crankcase”. If not, book it in – Holden should do this free of charge.*
  - *At each 80 k kms service interval, replace the O-rings between injectors and sleeves, and between sleeves and cylinder head, as a precaution. This will add little to the overall cost of the service, as the mechanic will already be working in this part of the engine, checking and adjusting the valve clearances.*
  - *If the oil level in the sump rises to the point that it enters the crankcase breather pipe, the engine may start to run on it’s own oil. In this situation, in Holdens words : “ this may result in an unintentional increase in engine speed, and possibly vehicle speed”.*
- If this happened, it would cause most people to get very alarmed, especially if it happened in heavy traffic, driving at high speed, etc.. The engine will no longer respond to normal throttle operation, and will continue to run even with the ignition switched off.*
- *In extreme cases, engines have been known to red-line and self destruct. In the UK, there have been cases of engines being replaced free of charge by Isuzu.*
  - *If a motorist is unfortunate enough to experience a run away engine, the best advice is to immediately steer in a safe direction, engage the highest possible gear and jump on the footbrake and hand brake together to stall the engine. Only depress the clutch or engage neutral as a last resort as this will allow the engine to spin freely out of control.*

*This will be alien to most normal driving, and against normal instincts. Failure to stop the engine at this point may lead to a very expensive engine rebuild. Staying on a high traction surface eg bitumen would be better than driving onto loose sand – spinning wheels would have little braking effect on the engine. Do not turn off the ignition before the vehicle comes to rest, to avoid locking the steering wheel.*

## What is a Diesel engine and questions on operations??

A diesel alters engine speed by varying the amount of fuel to the injectors.

**Disagree.** By the amount of fuel and AIR. And air is as important as fuel

A diesel does not need a throttle plate. In fact all it would do is restrict airflow and reduce efficiency.

**Disagree.** Amount of air coming to intake manifold and staying there prepared to be pushed in the cylinders is calculated and controlled by MAP sensor and Throttle body sensor.

If we can replace this to by airflow metering sensor like at petrol cars - yes, we can eliminate the throttle (possibly) but at our conditions - **we cannot.**

The size of the pipe x pressure inside = amount of flow through

Normally fuel injector output by the ECM controls air/fuel ratios (the Lambda ratio).

This is by using the data from ALL sensors: Fuel temp, intake air temp, coolant temp, MAP, TPS

Can you feed the EGR system with clean filtered air instead of dirty combusted air - This part is easy, but how you will heat it to the same temperature?

**That's a question.**

Another is a pressure of this pre-heated air and third is an oxygen concentration as well. Recycled air is used to reduce the burning temp in the cylinders by this I assume that oxygen concentration should be lower.

But it seems that Isuzu fitted a throttle plate mainly for the EGR, which means that throttle plate openings are timed to suit the EGR manifold vacuum requirement, so the system is well embedded in the ECM's programming.

EGR system is secondary.

It uses some data from Temp sensors, Pedal sensor, TPS and Map, and operates controlled by software algorithm, limited by EGR pressure sensor as well.

**About the picture of intake pipe and pressure.**

A thought that a square box marked at the picture is a silencer.

The surface of air filter is many times higher that a surface of this small hole joining the silencer to the intake pipe. Incomparably smaller, so no dumping of vacuum.

Crankcase vapours goes out with a bit of pressure that's the gas coming through the piston rings and accumulating inside the engine.

That's why all you need - guide them into the catch can where they change direction of flow and leave oil particles at the walls of the can. Please be careful with putting some membrane (or mesh) filters or anything else inside, because if you completely block the ventilation these gases could find another way to go by pressing out some seals. Just imagine that this could be a crankshaft seal at the back (near gearbox) and get the price of fixing these tuning results.



WBR Sergey



## 2. How the 4JX1 System Works:

### ***A close look at the HEUI System***

The HEUI fuel system consists of four basic components:

**1. HEUI Injector** Uses hydraulic energy (as opposed to mechanical energy from the engine camshaft) from pressurized engine lube oil for injection. The pressure of the incoming oil (800 to 3300 psi) controls the rate of injection, while the amount of fuel injected is determined by the ECM.

**2. Electronic Control Module (ECM)**

This sophisticated on-board computer precisely manages fuel injection and other engine systems. The HEUI injector solenoid is energized by an electronic signal generated in the ECM. Using input from multiple sensors, the ECM's dual microprocessors use proprietary software and customer-supplied performance parameters to produce maximum engine performance under any conditions.

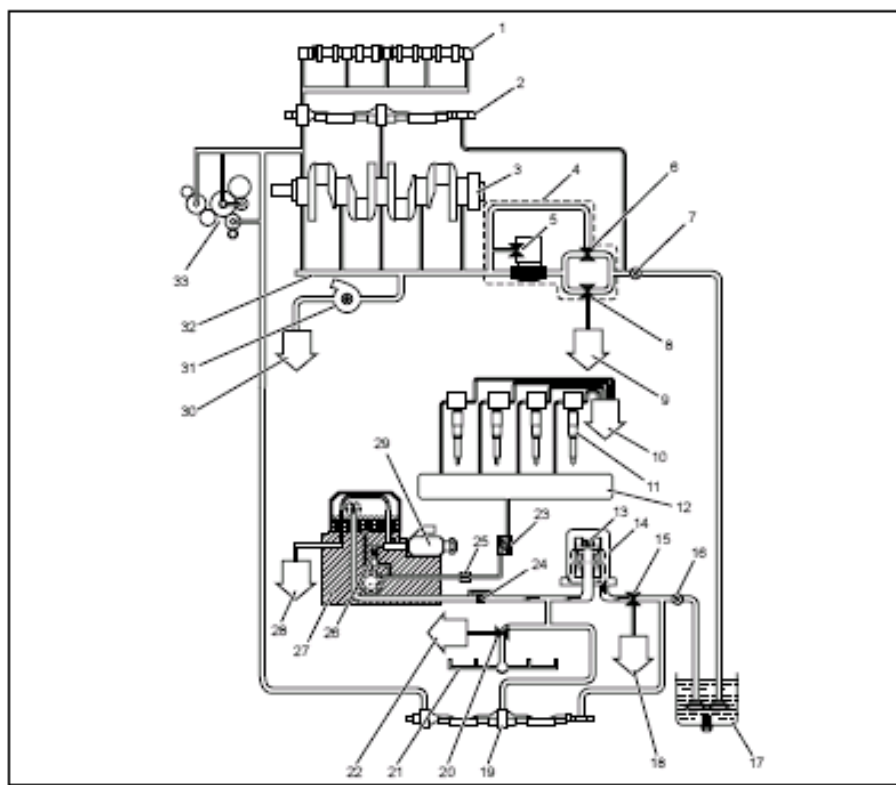
**3. High Pressure Oil Pump** The variable displacement axial pump features a built-in reservoir to immediately supply oil at cold starts.

**4. Injector Actuation Pressure Control Valve** This electronically operated valve controls oil pump output and injection pressure.

### 3. Oil Supply Diagram

#### 6C - 4 ENGINE FUEL

#### HIGH PRESSURE OIL PUMP, OIL FLOW



#### Legend

- |   |   |
|---|---|
| (1) Camshaft  | (17) Oil Pan  |
| (2) Balance Shaft   | (18) To Oil Pan   |
| (3) Crankshaft  | (19) Balance Shaft  |
| (4) Oil Cooler and Oil Filter Assembly                                    | (20) Cooling Jet Relief Valve 245 Kpa (2.5 kg/cm <sup>2</sup> / 36 Psi) |
| (5) Oil Filter Relief Valve 98 Kpa (1 kg/cm <sup>2</sup> /14.2 Psi)       | (21) Cooling Jet  |
| (6) Oil Cooler Relief Valve 245 Kpa (2.5 kg/cm <sup>2</sup> / 36 Psi)     | (22) To Oil Pan   |
| (7) First Oil Pump  | (23) Two Way Check Valve  |
| (8) Main Oil Relief Valve 588 Kpa (6 kg/cm <sup>2</sup> / 85 Psi)         | (24) Nipple Filter  |
| (9) To Oil Pan  | (25) Edge Filter  |
| (10) To Oil Pan   | (26) Edge Filter  |
| (11) Injector   | (27) High Pressure Oil Pump Assembly                                    |
| (12) Oil Rail   | (28) To Oil Pan   |
| (13) Sub Oil Filter Relief Valve 98 Kpa (1 kg/cm <sup>2</sup> / 14.2 Psi) | (29) Pressure Control Valve   |
| (14) Sub Oil Filter   | (30) To Oil Pan   |
| (15) Relief Valve 588 Kpa (6 kg/cm <sup>2</sup> / 85 Psi)                 | (31) Turbocharger   |
| (16) Second Oil Pump  | (32) Oil Gallery  |
|   | (33) Timing Gear Train  |

## 4. Diagnostic gear - TECH – II

<http://www.uobd2.net/wholesale/gm-tech2-gm-diagnostic-scanner.html>

I believe it is this card. <http://www.uobd2.net/wholesale/32mb-card-for-gm-tech2-1538.html>

ISUZU ISUZU-English 107.021 2006-2010

ISUZU-CANBUS is for ISUZU after 2010

ISUZU-K-line is for ISUZU from 1996 to 2010

Request the K-Line software as this covers our Jackaroo's.


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**PC, Laptop, or Netbook:** PC-based scan tools allow you to diagnose and troubleshoot problems with your car, truck, or motorcycle.

They harness the power of your PC, and have a number of important advantages over stand-alone scanners: <http://www.myscantool.com/store/>


<http://www.scantool.net/scan-tools/pc-based/> and: <http://www.easyobdii.com/index.php>

<http://www.control-tech.com.au/oil-rail-pressure-meter>

FUEL SYSTEMS

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## HEUI Fuel Systems



**The revolutionary HEUI injector design is critical to the precision, performance, economy and proven reliability of the HEUI Fuel System.**

***Advanced technology yields higher performance***

The HEUI (Hydraulically Actuated Electronically Controlled Unit Injector) Fuel System represents one of the most significant innovations in diesel engine technology in decades. HEUI surpasses many of the limitations of mechanical and conventional electronic injectors, and sets new standards for fuel efficiency, reliability and emission control.

Available as standard equipment on an ever-widening range of Cat® Engines and machines, the highly sophisticated HEUI system uses hydraulic energy instead of mechanical energy to operate fuel injectors. Working in tandem with the engine's ECM (Electronic Control Module), the HEUI system provides extremely precise control of fuel metering and timing, resulting in unmatched engine performance and economy.

## 5. Diesel - Initial analysis

### Diesel Troubleshooting

Probable Cause	Engine not starting	Hard to start engine	Runs rough at lower RPM	Lack of power	Diesel knock / pinking	Black smoke	White smoke	Blue smoke
Low compression	▼ X	X					X	
Low fuel pressure	▼ X	X	X	X		X	X	
Low cranking speed – flat battery	▼ X	X						
Glow plugs or relay faulty	▼ X	X					X	
Insufficient fuel supply	▼ X	X	X	X			X	
Fuel quality & contamination	▼ X	X	X	X	X		X	
Air – vacuum in fuel supply	▼ X	X	X	X				
Blocked fuel supply – filters	▼ X	X	X	X	X			
Faulty diesel injector(s)	▼ X	X	X	X	X	X	X	
Faulty high pressure pump	▼ X	X	X	X		X		
Faulty pressure regulator – sensor	▼ X	X	X	X				
Faulty low pressure supply pump	▼ X	X	X	X				
Air intake restriction	▼		X	X		X		
Turbo problems – waste gate	▼			X		X	X	X
EGR problems	▼			X		X	X	
Injector blow-by seat leaking	▼		X	X	X	X		
Cam – crank sensor	▼ X	X	X		X	X	X	
Injector wiring harness	▼		X		X	X	X	
Internal engine problems	▼ X	X	X	X				X

### The Answer is in the Smoke

We can generally understand what is wrong with a diesel engine by the colour of smoke emitted from the exhaust. There are three basic colours - black, white and blue.

#### Black Smoke

This is due to a air to fuel ratio imbalance, either the fuel system is delivering too much fuel into the engine or there is not enough clean air (oxygen) a few things to look for:

- Faulty injectors (injectors need attention at about 100 000 to 120 000 miles)
- Faulty injector pump
- Dirty air cleaner
- Turbocharger or intercooler faulty
- Problems within cylinder head, valves clogged up due to faulty EGR (exhaust gas recycling unit)

#### White Smoke

Normally means that the fuel injected into the cylinder is not burning correctly. The smoke will burn your eyes.

- Engine/pump timing out
- Fuel starvation to the pump causing the pumps timing not to operate correctly
- Low engine compression
- Water/petrol in the fuel

#### Blue Smoke

The engine is burning engine [oil](#)

- Worn cylinders or piston rings
- Faulty valves or valve stem seals
- Engine over full with engine [oil](#)
- Faulty injector pump/lift pump allowing engine [oil](#) to be mixed with the diesel



## 6. Diagnostics – Non Starting Engine:

### 4JX1–TC ENGINE DRIVEABILITY AND EMISSIONS 6E–49

#### Engine Cranks But Will Not Run

##### Circuit Description

In this type of injector system, the Engine Control Module (ECM) triggers the correct driver inside the injector, which then triggers the correct injector based on the 57X signal received from the crankshaft position sensor (CKP). During crank, the ECM monitors the CKP 57X signal. The CKP signal is used to determine which cylinder will fire first. After the CKP 57X signal has been processed by the ECM, it will command all four injectors to allow a priming shot of fuel for all the cylinders. After the priming, the injectors are left "OFF" during the next four 57X reference pulses from the CKP. This allows each cylinder a chance to use the fuel from the priming shot. During this waiting period, a camshaft position (CMP) signal pulse will have been received by the ECM. The CMP signal allows the ECM to operate the injectors sequentially based on camshaft position. If the camshaft position signal is not present at start-up, the ECM will begin sequential fuel delivery with a 1-in-4 chance that fuel delivery is correct. The engine will run without a CMP signal, but will set a DTC code.

##### Diagnostic Aids

An intermittent problem may be caused by a poor connection, rubbed-through wire insulation or a wire

broken inside the insulation. Check for the following items:

- Poor connection or damaged harness – Inspect the ECM harness and connectors for improper mating, broken locks, improperly formed or damaged terminals, poor terminal-to-wire connection, and damaged harness.
- Faulty engine coolant temperature sensor – Using a Tech 2, compare engine coolant temperature with manifold air temperature on a completely cool engine.

##### Test Description

Number(s) below refer to the step number(s) on the Diagnostic Chart.

4. An obvious cause of low fuel pressure would be an empty fuel tank.
5. The engine will easily start and run if a few injectors are disabled. It is not necessary to test all injectors at this time since this step is only a test to verify that all of the injectors have not been disabled by fuel contamination.
8. If there is an open or shorted driver circuit, DTCs P0201-P0204 should be set.

#### Engine Cranks But Will Not Run

Step	Action	Value(s)	Yes	No
1	Was the "On-Board Diagnostic (OBD) System Check" performed?	—	Go to Step 2	Go to OBD System Check
2	Check the 15 A injector fuse, the 15 A engine device fuse, and the 15A ECM fuse. Was a fuse blown?	—	Go to Step 3	Go to Step 4
3	Check for a short to ground and replace the fuse. Is the action complete?	—	Verify repair	—
4	Is fuel tank empty?	—	Fill the fuel tank	Go to Step 5
5	Is the right fuel using?	—	Go to Step 6	Replace the fuel
6	Is the right engine oil using?	—	Go to Step 7	Replace the engine oil
7	Using the Tech–2. Is DTC P0192 or P0193 set? (Check rail pressure system)	—	Go to DTC P0192 or DTC P0193	Go to Step 8
8	Using the Tech–2. Is DTC P0201 – P0204 set? (Check inject circuit fault)	—	Go to DTC P0201 – P0204	Go to Step 9
9	Using the Tech–2. Is DTC P1657 set? (Check ECM Main relay)	—	Go to DTC P1657	Go to Step 10



## 6E-50 4JX1-TC ENGINE DRIVEABILITY AND EMISSIONS

**Engine Cranks But Will Not Run (Cont'd)**

Step	Action	Value(s)	Yes	No
10	Refer to <i>Engine Mechanical Diagnosis</i> to diagnose the following conditions: <ul style="list-style-type: none"> <li>Faulty camshaft drive belts</li> <li>Leaking or sticky valves or rings</li> <li>Excessive valve deposits</li> <li>Weak valve springs</li> <li>Incorrect valve timing</li> <li>Leaking head gasket</li> </ul> Is the action complete?	—	Verify repair	Go to <i>Step 11</i>
11	Observe the "Engine Speed" data display on the Tech 2 while cranking the engine.  Is the engine RPM indicated? (If the Tech 2 is normally powered from the cigarette lighter socket, and if the Tech 2 display goes blank while cranking the engine, it will be necessary to power the Tech 2 directly from the vehicle battery.)	—	Go to <i>Step 12</i>	Go to <i>Step 17</i>
12	1. At the ECM (female) side of the connector mentioned in step , connect a test light between the ignition + terminal and one of the injector driver circuits at the same connector. 2. Ignition "ON." 3. Observe the test light, and repeat the test for each injector driver circuit by oscilloscope.  Did the test light stay on when checking any of the 4 injector driver circuits?	—	Go to <i>Step 13</i>	Go to <i>Step 15</i>
13	1. Ignition "OFF," disconnect the ECM. 2. Ignition "ON," observe the test light.  Is the test light "ON?"	—	Go to <i>Step 14</i>	Go to <i>Step 16</i>
14	Locate and repair the short to ground in the injector driver circuit.  Is the action complete?	—	Verify repair	—
15	Check for an open injector driver circuit.  Was a problem found?	—	Verify repair	Go to <i>Step 16</i>
16	Replace the ECM (Refer to the Data Programming in Case of ECM change).  Is the action complete?	—	Verify repair	—
17	1. Raise the vehicle and disconnect the CKP sensor harness. 2. Ignition "ON." 3. With a test light to ground, probe the harness ignition feed terminal.  Did the light illuminate?	—	Go to <i>Step 19</i>	Go to <i>Step 18</i>
18	Check the ignition feed wire between the sensor and the ECM for a short to ground or open circuit.  Is the action complete?	—	Verify repair	—

## 4JX1-TC ENGINE DRIVEABILITY AND EMISSIONS 6E-51

**Engine Cranks But Will Not Run (Cont'd)**

Step	Action	Value(s)	Yes	No
19	1. Ignition "ON." 2. At the CKP harness connector, connect a test light between the ignition and ground terminals. Did the light illuminate?	—	Go to Step 21	Go to Step 20
20	Check the sensor ground circuit for an open or short to voltage. Is the action complete?	—	Verify repair	—
21	Check the signal circuit between the sensor and the ECM for a short to ground, short to voltage, or an open. Was a problem found?	—	Verify repair	Go to Step 22
22	Replace the CKP sensor. Is the action complete?	—	Verify repair	Go to Step 16

**Reading Flash Diagnostic Trouble Codes [DTC] /Fault Codes:**

The provision for communicating with the Engine Control Module (ECM) is the Data Link Connector (DLC). The DLC is located in the front console box. It is used in the assembly plant to receive information in checking that the engine is operating properly before it leaves the plant.

The diagnostic trouble code(s) (DTCs) stored in the ECM's memory can be read either through a hand-held diagnostic scanner plugged into the DLC or by counting the number of flashes of the "Check Engine" Malfunction Indicator Lamp (MIL) when the diagnostic test terminal of the DLC is grounded.

The DLC terminal "6" (diagnostic request) is pulled "Low" (grounded) by jumpering to DLC terminal "4", which is a ground wire.

This will signal the ECM that you want to "flash" DTC(s), if any are present. Once terminals "4" and "6" have been connected, the ignition switch must be moved to the "ON" position, with the engine not running.

The "Check Engine" MIL will indicate a DTC three times if a DTC is present. If more than one DTC has been stored in the ECM's memory, the DTC(s) will be output from the lowest to the highest, with each DTC being displayed three times.

The DTC display will continue as long as the DLC is shorted.

+++++

Fault Codes and Interpretation: Posted 22 October 2009 - 10:05 AM

Don't worry about oil in the TPS potentiometer it will be in most Jacks out there, as there is no actual seal on the butterfly shaft and even when brand new, oil comes from the breather system not necessarily the turbo.

It is a simple carbon film POT and the fingers eventually wear the carbon film through.

The TPS is only used for input to the ECU regarding what level of EGR to apply to the engine, yes it can cause rough idle when on the way out but this is because the EGR valve is being told (by the ECU) the wrong information.

I have never seen hard to start and no acceleration caused by the TPS, my money would be on the ORP sensor for that problem.

Don't forget the easy way to find out what code is set when the check engine light comes on is to bridge 4 and 6 in the data connector - 2 minutes work and free.

TPS fault code is 73 or 74, ORP fault code could be 61, 62, 63 but regularly does not set a code when faulty.

Therefore NO ORPS fault code does not necessarily mean a fault! Cheers Dave L.

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## DTC for 4JX1:

### 6E-64 4JX1-TC ENGINE DRIVEABILITY AND EMISSIONS

#### ECM Diagnostic Trouble Codes

The following table lists the diagnostic trouble codes supported a Tech 2 and to flash. If any DTCs not listed ECM Diagnostic Trouble Codes

here are displayed by a Tech 2, the Tech 2 data may be faulty; notify the Tech 2 manufacturer of any DTCs displayed that are not included in the following table.

DTC using a Tech 2	Flash DTC	Description	MIL
P0107	34	MAP Sensor Low Voltage	ON
P0108	34	MAP Sensor High Voltage	ON
P0112	23	Intake Airtemp Sensor Low Voltage	ON
P0113	23	Intake Airtemp Sensor High Voltage	ON
P0117	14	Engine Coolant Temp Sensor Low Voltage	ON
P0118	14	Engine Coolant Temp Sensor High Voltage	ON
P0121	33	Accel Position Sensor Rationality	ON
P0122	21	Accel Position Sensor Low Voltage	ON
P0123	21	Accel Position Sensor High Voltage	ON
P0182	15	Fuel Temp Sensor Low Voltage	ON
P0183	15	Fuel Temp Sensor High Voltage	ON
P0192	63	Rail Pressure Sensor Low Voltage	ON
P0193	63	Rail Pressure Sensor High Voltage	ON
P1193	64	RPCV Circuit Open/Short	—
P1194	61	Rail Pressure System Low Voltage	ON
P1195	61	Rail Pressure System High Voltage	ON
P1196	62	Rail Pressure System High Warning	ON
P0197	16	Oil Temp sensor Low Voltage	ON
P0198	16	Oil Temp sensor High Voltage	ON
P0201	51	Injector #1 Circuit Fault	ON
P0202	52	Injector #2 Circuit Fault	ON
P0203	53	Injector #3 Circuit Fault	ON
P0204	54	Injector #4 Circuit Fault	ON
P0217	22	High Coolant Temp Warning	ON
P1217	36	High Oil Temp Warning	ON
P0219	11	Engine Over Speed Warning	ON
P0336	43	Crank Position Sensor Out of Syncro	ON
P0337	43	Crank Position Sensor No Signal	ON
P0341	41	Cam Position Sensor Out of Syncro	ON
P0342	41	Cam Position Sensor No Signal	ON
P0380	66	Glow Relay Circuit Open/Short	—
P0381	67	Glow Lamp Circuit Open/Short	—
P1403	32	EGR EVRV Fault	—
P1404	31	EGR VSV Circuit	—
P0405	26	EGR Pressure Sensor Low Voltage	ON
P1405	37	EGR EVRV Circuit Open/Short	—
P0406	26	EGR Pressure Sensor High Voltage	ON

## 4 JX1-T-C ENGINE DRIVEABILITY AND EMISSIONS 6E-55

DTC using a Tech 2	Flash DTC	Description	MIL
P0475	71	EXH #1 VSV Circuit Open/Short	—
P1475	71	EXH #2 VSV Circuit Open/Short	—
P1485	74	Intake Throttle Position Sensor Low Voltage	ON
P1486	74	Intake Throttle Position Sensor High Voltage	ON
P1487	73	Intake Throttle System Circuit Open/Short	ON
P1488	72	Intake Throttle Motor Control Circuit Signal Gap	—
P0502	24	Vehicle Speed Sensor No Signal	ON
P0510	75	Idle SW/Malfunction, Open Circuit	ON
P1510	75	Idle SW/Malfunction, Short Circuit	ON
P0562	35	System Voltage Too Low	ON
P1562	35	System Voltage Too Low at Cranking	ON
P1587	25	Brake SW/Malfunction [B]	—
P1588	25	Brake SW/Malfunction [A]	ON
P0601	55	ECM Checksum Error	ON
P1626	56	Immobilizer No Signal	ON
P1631	56	Immobilizer Wrong Signal	ON
P1648	56	No Security Code Entered	ON
P1649	56	Immobilizer Function not Programmed	ON
P0650	77	Check Engine Lamp Circuit Open/Short	—
P0654	27	Tachometer Circuit Open/Short	—
P1655	17	Thermo Relay Circuit Open/Short	—
P1657	76	ECM/Main Relay Circuit Open/Short	—
P1589	47	TransMission SW/Circuit Open/Short	—



**Service Intervals [found by 4JX1 users]**

Item	Distance	Change	Best Use/ Notes
<b>INJECTOR SEALS</b>	100,000-140000 km	<b>Yes</b>	
<b>CAT HEUI injectors for internal seal replacement</b>	100,000 - 150,000	<b>Yes</b>	
<b>Oil Changes</b>	5000 to 10000 km	<b>Yes</b>	Penrite HPR Diesel 5 or Mobil Delvac1, Castrol R-synth 5W-30, Mobil 1 5w50
<b>ORPS</b>	50000-70000 km	<b>Yes</b>	
<b>Throttle body position sensor</b>	50000-70000 km	<b>Yes</b>	
<b>ORPCV</b>	50000 km	<b>Clean</b>	Replace when necessary.
<b>Injector [CAT HUEI overhaul set]</b>	100,000km	<b>Overhaul</b>	CAT - Kit sells for about A\$65-85/injector [must change Cu washer]
<b>Wiring harness</b>	<b>At 240,000 km intervals</b>	<b>clean</b>	<b>Gidday to all,</b>  <b>HARNEX in Brisbane can re-manufacture the entire harness for an approx. \$200.</b>
<b>Coolant</b>	<b>50, 000km</b>	<b>Replace</b>	orange dexcool type coolant for Al heads/ radiators
<b>Glow Plugs</b>	<b>100, 000km</b>	<b>Check/replace</b>	
<b>Cam/ Timing Belt</b>	<b>100, 000km</b>	<b>Replace</b>	Type:
Valve clearance	20000km, then after every	30000km 50, 80, 120 etc	

**General issues and things to look for in your Jackaroo [when you first get it]:**

When I got the 2000 jack, the seller serviced it:

1. It was leaking oil out of all oil filters, (I replaced all);
2. cleaned engine, replaced turbo and oil supply line;
3. fixed oil leaking out of tappet cover,( with new seal and taking 2mm off spacers)
4. fixed leaking diesel out of metal block at back of motor, (missing copper washer) that Holden said they could not fix (took me 20 mins)
5. replaced timing belt and rollers, cleaned up wiring loom and plug, (that was full of oil and spray a sealer on top of plug) no oil so far,
6. Now next job is to have a go at why coolant is being pushed back into reserve tank,
7. I replaced thermostat and cap;
8. It only seemed to do it after was playing with glow plugs, as I had the manifold off, so back to removing it;
9. Well tried removing glow plugs snapped two, replaced one and left other one after cleaning and spraying with crc, wd40, and some other stuff, I
10. only have two working ok, So left it as is - Starts ok
11. and now will check that I had not missed something

Posted 27 December 2012 - 08:12 PM

An engine with good compression not only compresses well - it also sucks very well on the intake stroke.

Fluids may be drawn into the engine including:

1. engine coolant/water ( white smoke usually ),
2. excess & unburnt diesel ( white smoke usually ),
3. engine oil ( blue smoke usually ).

The HEUI injector system can produce nozzle tip pressures approaching 30,000psi. This means that a faulty fuel injector control system can put too much fuel into the engine. There is a fixed amount of oxygen so part of the fuel wouldn't burn in that case. You will then get white smoke smelling of diesel ( acrid ). i.e. unburnt diesel ( hence white smoke ) can come from sources other than a loss of compression:

- a. faulty injection

b. Fuel leaking past seals under partial vacuum into the combustion chamber.

White smoke may also come from water leaking past the injector seals, which is common in this engine. Therefore, check for error codes from the ECM. If there are none the problem is likely injector seals, not faulty fuel injectors. If there are error codes indicating injector failure, that section of the engine should be checked first. In my case there are no injector error codes.

Edited by chilby, 03 January 2013 - 01:49 AM steve - Like This

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## Routine Service – Things to help:

### Fuel Filter:

Posted 13 August 2012 - 09:41 PM

How to I depressurize the lines?

No need, just disconnect.

How will I know when I've got ALL the air out of the lines afterwards?

If you have all the air out of the filter the system will bleed itself.

Do I need a bung or something when I'm doing the small fuel filter back near the tank?

Didn't know there was one.

(Tank is full).

Do I fill the fuel filter under the primer (Z321) with diesel, or will it fill up when I pump to prime the lines?

It is easier to fill the filter up as much as possible before using the hand pump to get the last of the air out.

Do I HAVE to take off the Primer to get at the fuel filter, or is there a trick to getting the filter off?

I find it easier to remove the whole assembly and put in a vice to remove filter.

I've got a 2002 Jackaroo with the dreaded 4JX1 engine. So have I.

Cheers, Aaron.

+++++

**Things for a long trip:**

Posted 07 January 2014 - 08:58 PM

Hi Sam,

- a. ORPS with grinded wrench
- b. TPS and multimeter
- c. Camshaft sensor with wiring ( usually when aircon belt breaks down it cuts off wiring to this sensor)
- d. Oil and fuel filter kit
- e. Cable ties big and small, few clamps, duct tape and
- f. replace a radiator cup with a new genuine one;
- g. Every size water hose you can find;
- h. One of the most important things to put on board is your tool box. If you're not a tool type person it's still imperative that you carry some tools. The problem always is the tool you need is the one you don't have.

**So what are the basics?**

- i. Phillips & a flat blade screw driver (preferably a mixed set)
- j. Two 10 inch and two 8 inch shifting spanners (much rather a GOOD mixed set of metric and or imperial spanners)
- k. A pair of pliers, a wire stripper and Side cutters.
- l. A hammer.

**Spare Parts.**

- m. A range of globes for both car and van.
- n. Spare A/C and fan belts.
- o. Top and bottom radiator hoses and a length of heater hose. (this can be cut to suit)
- p. I recommend you replace your belts and hoses before your trip, and keep the old ones for spares.
- q. Extra engine oil and extra coolant (water can always be used in an emergency)
- r. A full size spade, a small camp spade, an axe and a tomahawk are always handy assets even if you don't plan on leaving the black top.

Cheers Sergey

## Battery:

*Alternate:* Delkor M27 marine battery, Century N70ZZ 4WD battery has 700CCA and 145RC, Supercharge Calcium-calcium 720cca & 160 Min reserve, I run a 650CCA RHS and a 550CCA LHS from Marshals, Century N70ZZ4WD 700CCA battery, 1000CCA Catapillar Battery

## Battery Isolators/ Charge Protectors:

<http://www.traxide.com.au/isolators/sc80---90-amps-standard.html>

This is the STANDARD SC80. The SC80 has been in production for more than 20 years since it was first introduced and it still has features that make it far more versatile than any other other isolators.

The Standard SC80 is available in 12 volt ( and 24 volt on request ) The SC80's first and most important objective is to protect the vehicle's main battery against being discharged bellow a point at which the battery would not be able to start the vehicle.

The Standard SC80 has a PRIMARY and a SECONDARY circuit. These circuits can be joined together and operated as a single 90 amp auxiliary battery charger, connecting the main battery to 1 auxiliary battery.

The Standard SC80 can be used to charge 2 auxiliary batteries via separate 45 amp circuits. So if there is one auxiliary battery under the bonnet of a vehicle and another in a caravan being towed by the vehicle, the SC80 will charge both batteries while the voltage at the main battery is at a high enough level.

After the vehicle motor is stopped, all the batteries to extend the operating time of the auxiliary batteries can share the power.

But once the voltage at the main battery drops to the cut out level, all the batteries will be isolated from each other.

## Dual Battery:

This is how I have done mine along with a bezel light from dick smiths and a momentary pushbutton from same shop.

To start I completely removed cabling from the positive side of the passenger side battery and also removed the other end from the connector on the solenoid of the starter motor. (Leave the negative where it is or if non existent, ie don't have battery there yet. then attach to engine block



on passenger side with a sturdy bolt and steel crimp soldered if you don't possess an industrial crimper. then wire the rest in as per the drawing attached.

I also put in an Anderson plug into the rear of the jack as well as to the tail gate for the trailer off the auxiliary stud of the smart solenoid with a 80 amp automatic circuit breaker fuse.

Hope this helps. Jas

+++++

## 7. Parts List:

	Isuzu	Ryco	Cooper Wesfil/Nippon Max	Change at
<b>Main Oil Filter</b>	Part 8-97167-972-0	Z600	WZ554/ MO-024	5000 to 10000 km
<b>Secondary Filter</b>		Z79A	WZ79 *	
<b>Air Filter</b>		A1081	WA1081	
<b>Fuel Filter</b>				Donaldson P550225 FF
<b>Tensioner Belt Tensioner/ Bearing</b>	NSK 835-139D WA1			TT10007
<b>Belt</b>	Gates T312			Supercheap

Out of all the above, the Wesfil products are not only the cheapest, but also seem best quality / suited to the Jackaroo. The main filter from them, appears to be almost identical in marking to the OEM, minus the Isuzu branding...

Contact Neil @ <http://www.sydneyfilters.com.au/jackaroo/>. He has all the Nippon Max and Wesfil Filters and is cheaper including the freight than what I can buy the lot locally. Just tell him you have the 4JX1 Jackaroo Diesel and he will do the rest.

## 8. Air Filters

### Oiled air filters

There is a history of filter oil residue causing problems with the td sensors, but if you are getting oil residue downstream of the filter then it is being over-oiled, which is common and easy to do.

I think Unifilter do a foam element for the td. I prefer the castrol filter oil or silkolene.

### Green Cotton filters:

They do make one for the 3.0TD, and are available from <http://www.greencottonfilters.com.au/>

The part number for the 3.0TD Jackaroo filter is R252209 and costs \$88 plus \$7 shipping in Australia.

SERIE	MODEL	HP	KW	ENGINE	YEAR	SHAPE	D1/	D2/	D3/	D4/	D5/	H	FIG.	PART N°	PRICE
TROOPER II	3,0L	TD	159	117	- 99->	ROUND	80	-	116	-	-	140	5	R252209	5

### Belts and replacement:

Belt	Gates	Bosch
Alternator belt	7385	11A0980
AirConditioner belt	9490	13A1245
Adjuster pulley - Fan - Harmonic Balancer/ bearings	BSC bearings Davco or Top Cog	

### OK here is a quick how to:

- Remove the battery, battery holder and tray.
- Undo the hose that connects the turbo and intercooler, you can take it off or just spin it out of the way.
- Undo the Air inlet, solid black tube on turbo. Also undo the clips on the air filter housing, lift the air inlet out of the way.
- Loosen the pulley on the adjuster for the AC compressor belt, release the tension and remove the belt.

- Loosen the adjuster bolt for the alternator, you will also need to loose the retaining bolt at the bottom of the alternator. Now you can let the tension off the belts and remove them.
- Replacing is the reverse of the above, except do up the alternator adjuster bolt (top one) first.
- To tension the alternator, the good old broom stick was a bit too bendy, I used a long socket handle I have, I didn't get them super tight, 10mm give between the fan pulley and drive pulley (Harmonic Bal.)

### Alternator Specifications:

Posted 14 October 2008 - 11:56 PM <http://forum.australia4wd.com/index.php?/topic/12184-4jx1-alternator-two-plugs/>

According to my Jackaroo workshop manual, the '98, '99 and '02 model 4JX1 had either a LR190-750B (90amp) or a LR-1100-731 (100amp) alternator. The '00 and '01 4JX1 had either a LR160-734B (60amp) or a LR-170-760 (70amp) alternator.

A search on the 'net of your part number ALT170760 shows it's a 70 amp model, but as to which pin does what, sorry, can't help there. If I were you, I'd get the 90 or 100 amp model, provided the connector matches, the extra grunt could come in handy on a driving light/car fridge equipped, glow-plugged diesel with (possibly) long cranking times and (possibly) short trips. Psychster

Posted 16 October 2008 - 11:37 AM

For future reference, this seems to be a good deal!

[http://www.jaylec.co...tins/NP4\\_07.pdf](http://www.jaylec.co...tins/NP4_07.pdf)

Note the Rectifier/Regulator assembly (part number 16-3123). I was quoted \$125.93 + GST + Freight.

A much cheaper solution than the \$1400+ Holden wanted for a new genuine alternator!

And the following supplier: <http://ishop2.cooldrive.com.au/>

Code: 65-3122

Description:

ALT HOLDEN RODEO MONTEREY NEW 12V 90A 4JX1 98-04 3.0L - Holden Jackaroo, Rodeo 3.0Lt, 4JX1T

12V 90A Internal Reg

Specifications

Voltage 12V

Amperage 90A

Regulator      Internal Reg

+++++

## Regulator Problems/ Alternator:

Posted 18 February 2013 - 08:08 PM

Hi,

Just wondering if anyone can help, my battery is constantly running flat. I have replaced my battery and put a new alternator in but it still hasn't fixed the problem..... Any ideas?

This problem has only come since i had the recall done by Holden, i just looked at the loom they replaced and there is a thin black wire which isn't connected. could that be a problem?

Also while I have you reading can someone give me please explain where the "white wire" is located? Hopefully that may fix my rough idle and power loss...

Cheers, Matt

Posted 20 February 2013 - 09:05 PM MattPorter, on 18 Feb 2013 - 10:55 PM, said:

Cheers mate, I have checked all the contacts, wiring and fuses. What purpose does the big blue charge relay serve? Could that be it?

I will tell you about MYJackaroo, but I have found that the wiring on Jacks varies, that the Australian model differs totally from the overseas models and there are NO wiring diagrams available to the public for under \$500 in my search so far. Proceed with caution!

The big blue charge relay is the main conduit for power from the alternator to the battery while the engine is running.

A faulty relay will inhibit or stop charging of the battery while she is running. This may be your problem.

Also, a short circuit in the relay solenoid circuit would possibly connect the battery +ve to earth at rest. This may also be your problem.

The cheapest way to test for this fault is to swap it for another relay and see if the fault disappears.

I use the "air bag" relay to swap for personally. The advantage of this is > if you stick a faulty blue relay in the airbag socket then the warning light for airbags will light up in the dash when she is running, but the vehicle will still run perfectly well. So if you swap those 2 relays and 1.) The car starts to charge normally & 2.) The airbag warning light comes on... then you know the big blue relay is definitely furked.

I will warn you that when I tested all my relays on the bench they tested good. However my main ECM relay was totally knackered and this only showed up by swapping relays and running her > i.e. the fault

only occurred under load. For this reason, it is often wise to simply replace a suspect relay or fuse on the off chance. It takes about 30 seconds.

Relays are not expensive to replace.

Edited by chilby, 20 February 2013 - 09:14 PM.



## 9. Fuel Supply:

### Fuel Filter

I also fitted a non-return valve in the fuel line just upstream from the filter, as I had been advised an air leak could sometimes develop around the filter, leading to air ingress when stood overnight. A bloke in the UK **told** me this was yet another known (irritating) problem with this engine - the valve was only about \$20 so I thought nothing to lose.

'christd1', on 05 Nov 2009 - 10:40 PM, said:

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#### **CAV fuel filters:**

Gents I am thinking of fitting a CAV fuel filter with a glass bowl as a) back up for main filter and B) to see when I have water in my diesel. Has any one fitted one of these fuel filter set up?

If so were did you mount it. Pics would be greatly appreciated.

Found a supplier for the CAV fuel filters and all their other styles of filters here in Nowra [Grimes Diesel Service, Lot 1 Merroo Rd Bomoderry NSW PH: 02 4421 0791] Most standard fuel filters are 8-10 micron whereas the R2132P filter is a 4micron filter. This improved filtration combined with the added bonus of a water and sediment sight bowl result in greater pump & injector protection.

The cost of the replacement R2132P filter cartridge can be as little as 1/10th the cost of the factory fuel filter, so the assembly often pays for itself in the first few filter changes, ignoring the future cost savings related to the extended life of the pump and injectors.

I bought a cav unit from Whitworths (Boating chandler) for \$80. The cartridges are about \$12. and real easy to get hold of.

Cheers

Here's a simple solution. Go to the filter shop, get hold of a new filter for your Jack. Then find one with the same size top ring and thread which has a bottom drain. Use that instead and you have your water trap. Alternatively get a water trap off an older Jack or some other make/model and fit before your existing filter.

What is the number of the filter on a 4JX1 BTW? I could check out a filter site that I have bookmarked.

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Posted 14 May 2012 - 08:44 PM

You say you have cleaned the little flap valve. OK that's good but the trouble is there are 2 flap valves, the other one is not accessible as it is inside the head of the filter. You can't get to it without cutting open the pressed on metal cap.

Not an option if you want to continue using it. You could take the filter head and try getting some petrol into it, blocking all the holes with your fingers, shaking it about around, and then emptying it into a clean container. Keep repeating this until you are sure no more dirt or bits come out.

Another problem is the "rubber" diaphragm can deteriorate and leak. In that case you will find the fuel may leak a little around the plunger. Air can get in causing poor running and starting or even no start. Fuel will leak back to the tank and will be replaced by air through the leaking diaphragm.

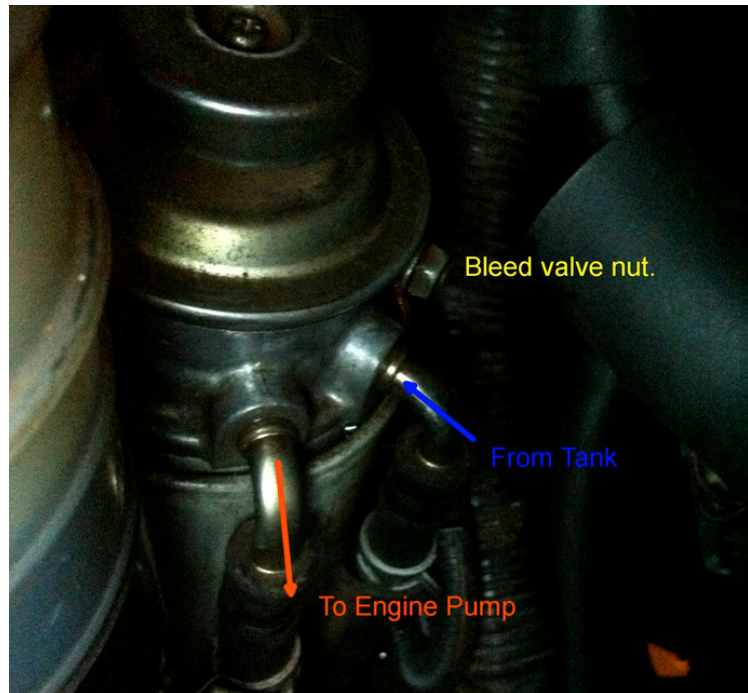
BTW your tank won't rust but it may not be clean. The pickup is not going to be blocked by paint or rust. You could take off the tank cap then blow back down the pickup pipe (from the engine bay) with compressed air. Then drain some fuel out the tank. The only way to clean the tank properly is to take it out, as the drain is way too small to flush the dirt out.

In the process of going right through the systems. I discovered the primer pump wouldn't prime... so after scratching my head a lot took the primer pump out, benched it and connected 2 hoses with a bottle of diesel at both ends. It worked perfectly when I pumped it on the bench.

But I noticed one simple problem...  
The mechanic who last worked on it had connected the fuel hoses the wrong way round!

So this weekend she'll be back in the engine bay and I expect the vehicle will run ok now. After all engines never run well with any gas. And I suspect the flap valves work in reverse if the hoses are back to front and stop fuel flow entirely.

For future reference I've put a photo on here of the correct plumbing. I must say the plumbing is not intuitive (so perhaps my pump is from a foreign vehicle so check yours before relying on this photo please). The hose fitting closest to the tank is in fact the outlet to the fuel pump. My best guess on why this is so is that the Isuzu Trooper was designed as a LHD vehicle so the engine bay would be partly reversed to allow for the steering column.



### Water Scan Filter:

<http://forum.australia4wd.com/index.php?/topic/26797-waterscan-fuel-filter/>

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## Fuel Pump:

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### 10. OIL CHANGES:

Most likely the wrong grade of oil was used.

The oil must be 5W 30/40 (0W if in cold climates) else it wont start.

Interestingly the 2 oils that is known to work well with this engine (Penrite HPR Diesel/5 and Mobil Delvac1). Both have the lowest pour points available from oils (around -48 degrees C)

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### Notes on Oil related matters:

The injectors are hydraulic? (Correct me if I am wrong) and use the oil to operate.

If there is not enough oil pressure, they don't fire.

Pretty simple really.

Many 4JX1 owners and myself use Penrite HPR 5 5W40 oil with Nippon Max filters which can be bought from Sydney Filters.

Ryco filters have caused oil pressure issues for some people.

Small oil filter meant to be changed every second service so 20,000km

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### OIL TYPE:

The other question I have, is why would Holden recommend an oil that is SL/CF rated?? Isuzu recommends a minimum of CH-4 or better. In the industry that I work it, the OEM recommendations are there for a reason, and it takes a great deal of engineering research to deviate from it, even then it has to be promulgated before end users can use the alternative.

**HPR DIESEL5: CH-4 rated:** "Penrite HPR Diesel 5 meets the requirements of API CH-4/SL and the European Standards ACEA A3/B4 and E/4, as well as many manufacturers specifications.

Designed for used in the latest generation light duty diesel engines including the new generation common rail and hydraulically actuated injector equipped units. Specific examples include BMW Td6, Hyundai Terracan, Land Rover Td5, Range Rover Td6 and Holden Jackaroo 3.0L diesel engines."

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## Oil Pickup:

There have been instances of the “oil pickup” in the engine sump breaking off. These are found by topping up oil levels when suspected and then engine starting.

Pickup pipe on the oil pump been fixed under a recall. As I recall they were prone to falling off. Had mine a 2000 se fixed under warranty whilst I had a fault on a pressure relief valve rectified.

Pipe Oil Strainer GM-8980125320 and Gasket Oil Strainer GM-8971377980

Revised high pressure oil pick up pipe next to the old style, the old ones bracket is about 2mm thick and the new one about 7mm. This is due to the old one being so thin the vibration and heat of the engine and it has a tendency to warp and even brake the bracket causing the pipe to fall out causing a lot of problems from no start, hard start and even stalling



---

### Slow rise of Oil pressure on start-up:

\*\* I also had this problem of oil pressure taking 5 seconds to come up on cold start. I discovered that the problem was the oil cooler (which sits on top of the oil filter housing) draining slowly into the sump when the engine was shut down. The oil filter housing bolts to the engine block and has an o-ring surrounding it, which prevents oil leaking externally. There is no gasket to prevent oil moving between the two ports to the engine block so if the oil filter housing is not tight against the block a slow leak can exist which allows the oil cooler to drain. I cured the problem by tightening the 4 nuts holding on the oil filter housing.

I would think that the only way this problem could damage the turbo is if the engine is revved up straight away on start up before the oil pressure comes up. The owner's manual warns against this.

If the oil pressure is taking longer than 5 seconds to come up then suspect the oil filter non-return valve. I had a problem with a non-Isuzu oil filter, which had a faulty non-return valve. Oil slowly drained from the filter and if the engine wasn't started for a couple of days it took about 15 seconds for the pressure to come up.

\*\*\* We had a problem with our Oil pickup in April that lead to the turbo destroying itself. Turns out that the O-ring on the oil pickup failed/or was failing and the lubrication oil circuit received no oil. This was indicated by the low oil pressure coming on when starting.

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\*\*\*\*\*I had an indicated Lubrication-oil pressure failure. The easiest place to start was the lub-oil suction seals. I did the work myself, as I was not game to move the vehicle. It is not a difficult job.

Before you proceed though, you can try over-filling your sump with about 2 litres of oil. This will raise the oil level to a point above that of the suspect seal, thereby excluding air from the suction. Fire the engine up and see if there is any improvement. Obviously if the problem is rectified then the seals are gone and will need to be replaced. Do not run your engine for longer than is absolutely necessary while the sump is overfilled.

To change the seals (they are not expensive - about \$7-00 for both), and you might as well do both, you will need to put the car onto axle stands until the front wheels are at least clear of the floor. Remove the cross-member immediately behind the oil pan. Drain and remove the oil pan - you will need a 12mm thin-walled socket spanner (a 3/8 drive will do it) as there is not much room around the bolt heads.

The jointing compound they used on the pan is extremely strong, so be careful not to deform the pan as you remove it - try running a knife around the joint as you go.

Try to resist any lateral movement as you remove the pan, as the suctions are very close to it and are bent easily. When it is removed, the suction lines will become immediately obvious, and if the seals are worn, will practically fall out when the retaining bolts are undone. Be careful with them, they look very robust, but are not. The engine lubricant oil suction is on the driver's side of the engine, you will see that its seal is above the normal oil level, whereas the other one is fully immersed. Clean the jointing compound from both faces of the oil pan joint - I found kero and a "scotch mitt" to be best, otherwise persevere, both surfaces must be spotless. For reassemble you will need to rejoin the oil pan with a suitable compound - I found Permatex Blue to be very good.

After all that, (I did not do the overfilling thing) the problem was not rectified and I eventually traced the fault to the pressure sender mounted on the oil filter block. That part cost me \$237, and I had to remove the top control arm of the suspension to get at it. Although this is not a job for the faint hearted, it can be done.

\*\*\*\*\* timg, on 7 Sep 2007, 06:31 PM, said: I have a 98 Jackaroo 3.0 TD with 138000 on the clock with long motor replaced under warranty at 90000. I've had inconsistent oil pressure issues but the most annoying problem is that after short trips when the engine is up to normal temp it takes ages to start. If it is left 15 minutes or more its fine. Cold starts take about 5 cranks. I've had the injectors done, rail pressure sensor replaced, harness replaced, EGR valve replaced. Are there pearls of wisdom that the apostles can shed??

I've had a similar problem with mine after I dropped a fan belt. It was the crank angle sensor, which is within striking distance of the belt. I replaced it and all was fine. If you do purchase one shop around as the genuine article varied by about \$40.

A leaking o-ring on the oil pickup pipe in the sump (the long one) sometimes causes inconsistent oil pressure. Check the short one as well when you take the sump off as all except the very latest design

had a tendency to break off and stop the injection system from working - if it's on the way it may contribute to difficult starting. As always, if you find a cure, let the forum know.

\*\*\*\*\* I think I'm dreaming?? After checking what I could I've changed oil and filter. Used Castrol Magnetec. The hot starting problem and oil pressure fluctuations have gone, have just traveled 1100 kms with no problems at all. Holden dealer using Mobil 4X4 oil did previous oil change.

Can it be this simple??

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### Hot starting problems:

The oil pressure gauge is that of engine lubrication only not fuel injection pressure system.

- a. Check the intake butterfly and sensor as that could be a starting point,
- b. What is the rail pressure sensor like?
- c. What is the rail temp sensor like?
- d. is there oil in the injector harness is it sucking air in the fuel system, is there a carbon build up in the map sensor,
- e. Has your thrust bearing worn out pulling the fly wheel away from the crank angle sensor
- f. is the cam sensor open circuiting,

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do you have a trailer plug that is shorting the ecu.

ummm I am sure I might think of some more possibilities tonight

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### Injector Harness Seals:

4JX1 injector harness seals (engine end has 4 x white/blue all-weather seals on top of the injectors and 1 x white/maroon seal for the oil pressure sensor) as separate parts. My seals have deteriorated and need to be replaced.

Waterproof electrical wire connector plug – [try e-bay for source](#)

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## Catch can

Bugbear Posted 06 April 2010 - 09:44 PM

I fitted a catch can a few years ago. Started with a SCA rectangular can and added a few internal parts to catch the oil. Fill one side with stainless steel wool scrub (from kitchen supplies) and the other side with nylon filter material. Empty quite a bit of oil out every time I change the oil, so it must be doing something. Still get some oil in the intercooler, but not a lot, and there seems to be a lot less on the turbo inlet. Posted 06 April 2010 - 09:46 PM

I have put 1 on my patrol, no more oil running into the intercooler and hoses, have the Provent 200 purchased from western filters.

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## 11. Engine head

Some reading: <http://forum.australia4wd.com/index.php?/topic/25194-top-end-overhaul/>

## Injectors

The vehicles were sold in Australia by Holden (GM) as the Jackaroo. In Australia, these problems appear to be little understood by the general Holden dealer network. There has been a single campaign to replace injector sleeve sealing O-rings, but no indication of replacing the injectors themselves. The relevant Campaign Notice is available at the Product Recalls *Australia website* : [http://www.recalls.gov.au/view\\_recall\\_detail.php?Recall\\_ID\\_Auto=I3023](http://www.recalls.gov.au/view_recall_detail.php?Recall_ID_Auto=I3023)

Early injectors (up to Serial No. 519266) used a rubber O-ring material (green colour probably Viton) but later ones were fitted with ceramic seals instead. Whenever owners are having injectors replaced, they should ensure only later model injectors (ie after 519266) are fitted, as these will have the most recent ceramic seals.

Based on extensive experience in the UK, my overseas contact advised that all injectors fitted to early vehicles up to about 2001 (ie those fitted with rubber O-rings prior to later ceramic seals) are likely to have a problem at some point, and would need to be replaced. From 2001 onwards, it seems if they are going to go, they fail early (say approx 30 k kms). Failure of the later model injectors (ceramic seals) appear to be very rare.

## Gaskets and seals needed to change the injectors

Item	Holden part numbers	Number	Notes
gasket nozzle	GM-8972407980	4	washers, 'o' rings, and seals
gasket injector nozzle	GM-8971757830 4	4	
gasket injector nozzle	GM-8971611092 4	4	
gasket HP oil pipe	GM-8971842160		
gasket Throttle Body	GM-8971378200		
'Rocker cover gasket'			
EGR Port gasket	GM# 97137811 or 8-97137811-1		between exhaust manifold and head
Exhaust manifold gaskets	EM3202		ACL (Aftermarket)

## Injector Sleeves – removal/ replacement

Techniques are:

- <http://forum.australia4wd.com/index.php?/topic/22839-injector-sleeve-repair-do-it-yourself-step-by-step/> and:
- <http://forum.australia4wd.com/index.php?/topic/22824-technical-article-injector-sleeve-replacement/>

In complete form as a “step-by-step” above and see end of document for diagram.

Commercially available: Kent-Moore EN-49960 Injector Nozzle Sleeve Puller

## Manifold gaskets

Yes you can change the manifold gaskets without removing the turbo or dump pipe (and gaskets) from the manifold, if you want to be tight. Just need to undo a \$5 exhaust flange gasket under the car and then put a slit in your new gasket for #3 cylinder only.

The cut needs to go on the LOWER stud hole (from lower stud hole in gasket down-ways to the OUTSIDE of the gasket). This is because it was the only stud that the manifold did not come clear of. The cut will allow you to wrap the gasket around the stud. Mines not leaking!

## Valve Clearance:

chilby, on 24 Sept 2013 - 01:57 AM, said:

Note the attached sections from the manual. I'm not clear on what your question is, but the cold valve clearance is 0.15mm INLET. 0.25mm EXHAUST.

Adjustment is by the standard method on OHC engines of putting different thickness shims in. The standard shim is 2.8mm.

You will note in the manual that valve gaps are checked when cylinder 1 is at TDC, and then when cylinder 4 is at TDC one 360 degree rotation of the crank later. Which valves to check when are in the manual.

There is nothing in the manual to suggest that the inlet and exhaust cams are interchangeable. The diagrams show, which valves are closed through one 360 degree rotation.

You will note that through the 360 degree rotation the two adjacent cylinder pairs ( 1+2 then 3+4 ) close on the inlets, But during the same rotation consecutive cylinder pairs ( 1+3 then 2+4 ) close on the exhaust.

The whole valve closing sequence is not shown of course but this suggests that even if the camshafts are located differently on the main drive gear in from the cam timing belt, one set of lobes is different to the other.

Personally I always put them back the way they came out and hadn't checked to see if they're identical. Gasket arrangements change during the model progression. Generally a later set suits all.

I wouldn't have thought they would be interchangeable either. I suspect it will need to be re setup. Being sent back down. As for the gaskets or head-set the mechanic is just concerned that there wasn't much in the way of other little bits.

I'm running blind here so just trying to gather info.

## VALVE CLEARANCE ADJUSTMENT

### NOTE:

1. Valve clearance should be inspected and adjusted while the engine is cool.
2. The tightening of the camshaft bearing cap and camshaft carrier assembly should be checked before inspecting and adjusting valve clearance.

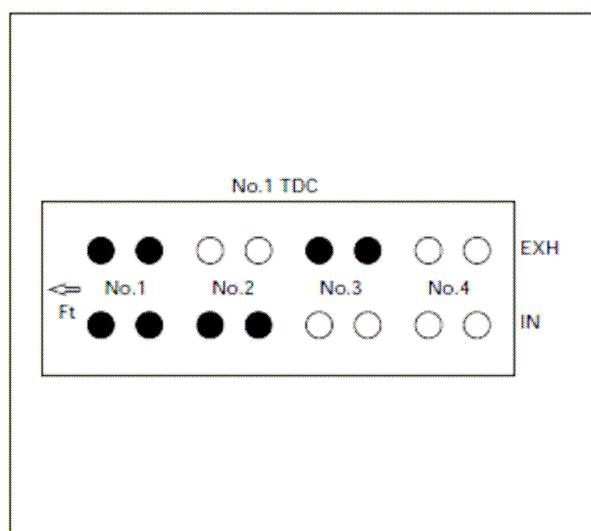
### INSPECTION

1. Remove cylinder head noise insulator cover and cylinder head cover.  
Refer to "Cylinder Head" in this manual.
2. Disconnect all harness connectors of the injector and remove harness assembly.
3. Drain oil from oil rail assembly.
4. Remove injector clamp nuts and fixing bolts to take out injector assembly.
5. Loosen oil rail bolts, remove oil rail assembly.
6. Set cylinder No.1 to the TDC at the compression stroke. Make sure that there is play in cylinder No.1 tappets on inlet and exhaust sides and that there is no play in cylinder No.4 tappets.
7. Measure valve clearance at No.1 TDC (Refer to the black circles indicated in the illustration).

#### Standard Valve clearance:

Intake valve: 0.15 mm (0.0059 in)  $\pm$  0.05 mm (0.0020 in)

Exhaust valve: 0.25 mm (0.0098 in)  $\pm$  0.05 mm (0.0020 in)

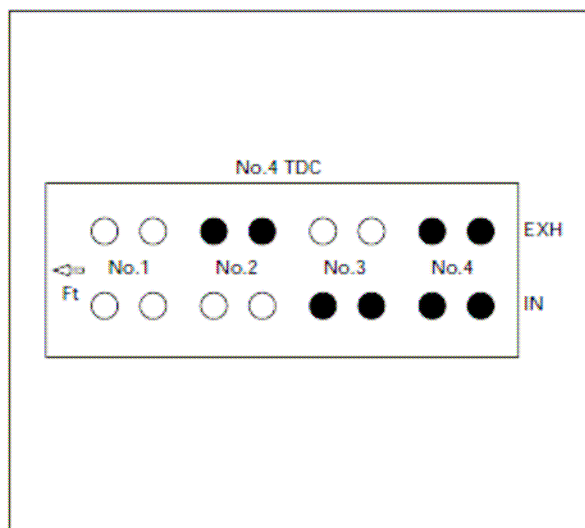


8. Turn the crankshaft one turn to set No.4 cylinder TDC at the compression stroke.
9. Measure valve clearance at No.4 TDC (Refer to the black circles indicated in the illustration).

#### Standard Valve clearance:

Intake valve: 0.15 mm (0.0059 in)  $\pm$  0.05 mm (0.0020 in)

Exhaust valve: 0.25 mm (0.0098 in)  $\pm$  0.05 mm (0.0020 in)



10. If measured value is outside standard value, readjust the valve clearance.

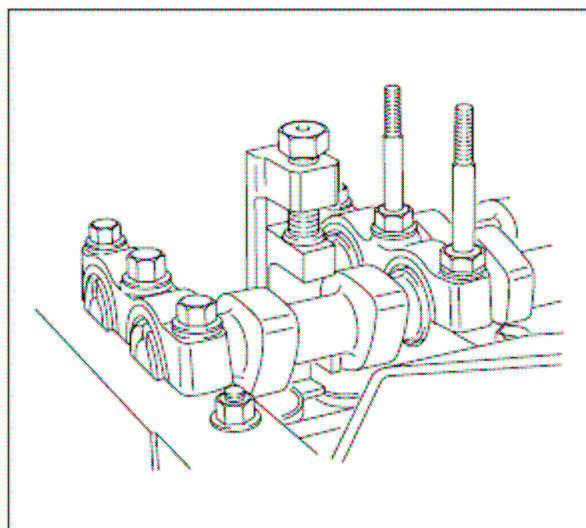
### ADJUSTMENT

For valve clearance adjustment, follow the procedure given below.

1. Set cylinder No.1 or No.4 to the TDC at the compression stroke.  
Set the valve clearance adjusting tool on the tappet requiring adjustment.  
After making sure of the correct setting of the special tool, depress the tappet by turning the bolt.  
Valve Clearance Adjusting Tool: 5-8840-2590-0

NOTE: Before depressing the tappet, set the tappet notch in the direction where adjuster can be easily taken out.

2. Take out the adjuster using a small screw driver and finger magnet.



## Exhaust:

I decided on 2.5in tube from the turbo back. Originally went with no muffler or cat and fuel economy was improved as was the power. Noise wasn't a real issue as the turbo's keep the noise down to almost legal limits (just don't flog it around town). The problem that developed was there was not enough backpressure on the engine so no engine braking (or very little) and the turbo didn't enjoy the experience either.

Installed a 2.5in straight through muffler and no more turbo problems but a little more fuel usage and less power (but more than factory). The whole system in mild steel including muffler was \$250 installed at Dandy Exhausts in Melbourne.

I had a new mandrel bent 2.5in system installed from the turbo back with new flexible joint and flow through muffler for under \$400 if that helps you in your decision. Give the genuine one a miss. Cheers My Roo.

Hi Jack,

I have recently had a new exhaust system fitted to my diesel Jackaroo (2000 SE, 4JX1). It is mild steel pressed bend 2.5" system from the dump pipe back, with a straight through glass packed muffler, and resonator just aft of it. Total cost was \$360 (fitted). The catalytic converter was removed.

The new exhaust has been routed the same as standard. It's O.K. except the increase in pipe diameter has reduced ground clearance a little. I would recommend following along the right torsion bar and crossing over to left side of vehicle some where aft of the gearbox / auto transmission to maintain good ground clearance.

As for the muffler, it was a bit loud and I have installed a much larger one (twice the size) with heaps more glass material inside it to absorb the noise. It's still straight through but unfortunately it cost me another \$120 though! : angry:

One other thing, make sure a flexible joint is used some where in the system. This takes out engine vibration. They didn't fit one to mine initially, and the vibrations were excessive. I could feel them through the footrest, and my seat back.

Overall performance has increased. The engine feels more responsive under acceleration and it holds a higher gear when overtaking on the highway and going up hills. The only down side is that max torque seems to come in a little bit higher up the rev range now.

The biggest improvement from my point of view was fuel economy. My wife drives the car mostly (short trips to the shops, dropping off the kids to school etc) and the roo was averaging 11.5 - 12.5 ltr/100km. Now it has dropped to 10 -10.5 ltrs/100km. Highway consumption is even less, the best so far has been 9.8 ltrs/100km. (Note: these figures were achieved with tyre pressures at 45psi, air "unifilter" installed, and conservative throttle application.)

Overall I'm happy with the out come, but noise levels are higher in the cabin than the standard one. I'd recommend discussing all your concerns with the installer before hand, and if you're not happy with their answers, keep ringing around.

Just as a comparison, Beaudesert Exhausts will do a 2.75" custom mandrel bend straight through system with glass packed muffler and a new dump pipe for \$935 plus \$125 fitting. They claim that noise levels are the same as the standard one, and ground clearance will not be compromised. In hindsight I would probably use them after the niggling issues I had with my system.

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Hi ANT and everybody else

You can stop the ECU from learning too much by putting a restrictor in the line from the Intake manifold to the MAP sensor. Basically as has been discovered if the ECU detects that the boost is rising faster than a standard engine should (because you have changed the exhaust) then the ECU determines that it must be putting in too much fuel and so reduces the fueling until the engine comes back within spec. I have put a restrictor (1 mm hole) in the MAP sensor line and increased the volume of hose between the restrictor and the MAP sensor (300 mm length of hose). I believe it works as follows.

Placing a restrictor in the MAP sensor line causes a delay between when boost pressure arrives at the manifold, and when that pressure bleeds through the restrictor and is then seen by the MAP sensor. Adding volume between the restrictor and the MAP sensor increases this delay. You will need to test by trial and error to get the correct amount of delay so that the ECU sees the rise in boost pressure as being normal. Eventually the pressure equalises (a fraction of a second actually) and so the MAP sensor still sees the actual pressure there is however this slight delay tricks the ECU into thinking that the faster boost rise is still normal. If you put too much volume between the restrictor and the MAP sensor the horsepower plummets as the ECU then thinks that there is not enough air entering the motor and so cuts the fuel. There appears to be a narrow window where acceleration is maximum and the ECU does not try to learn around your new exhaust.

PS I had the same problem with a large exhaust and then had an even bigger problem when I fitted a Digital Fuel Adjuster DFA which actually increased the fueling and power substantially and so have been playing with this for a couple of months.

By the way I have a 3 inch mandrel bent exhaust which comes off the turbo and straight down the drivers side until past the gearbox after which it crosses over and follows the standard path. This exhaust makes changing the oil filters heaps easier. My muffler is a straight through, even after specifically telling the exhaust guy that I wanted a full "proper" muffler, and makes a constant annoying drone.

The best improvement in economy and drivability I have experienced is definitely from fitting the DFA however I think this is only because I had already done the exhaust. So far I have only got around 10% improvement over standard and I know that fuel economy can fall by that much simply by having the wrong oil in it.



fisko, on 17 Aug 2008, 09:47 PM, said: hi edgo just thought i would BUMP to see how you went with the ECU. Fisko Hi Fisko,

I have been able to stop the ECU from learning around the big exhaust and DFA by placing a restrictor, and adding length to hose in the line to the MAP sensor. The restrictor has a 1 mm hole of about 15mm length and I have put a 350 mm length of hose between this restrictor and the MAP sensor. I just did a 6000 km trip towing our 24ft caravan down to the snow fields and the ECU seems perfectly happy with this setup and has shown no signs of performance drop.

I believe the restrictor and hose length introduce a delay in the sensing of the manifold air pressure thereby tricking the ECU into thinking that the engine is still operating normally even with the bigger exhaust and alterations to the fuel injection making the power and boost come on much faster than a standard engine. edgo

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### **Poor Idle Quality:**

JohnTD, on 2 Jan 2008, 03:15 PM, said: Could one of the experts tell me if poor idle quality can be fixed by getting the (existing) oil pressure sensor calibrated with Tech 2? The poor quality idle has existed since the injectors were replaced on recall. I wonder if the mechanic calibrated the oil pressure sensor when the injectors were replaced?

Lately the engine is starting to hesitate on pick up from idle. Idle OK when cold, poor when hot. Cold oil pressure 600kpa hot oil pressure 400kpa.

**Could it be possible that the injectors weren't graded correctly upon installation?**

### **MAP Sensor/ EGV valve:**

Doing some checking in the manual: Quote: ' that round object with the triangle on the outside also fixed to the manifold. That's the EGR valve.

Quote: 'underneath the little black box that sits at the front of the inlet manifold behind the radiator hose. The black plastic box is the MAP sensor. The black box (20cm x 7cm at a guess) is a resonator in the air induction

"A resonator is used also in the air duct between the air cleaner and turbocharger to reduce air intake noise."

The MAP sensor is mounted on a bracket near the EGR valve, it is about 10x3cm at a guess, I can't see from the manual where there is an air hose connected to it, this is mounted with the EGR VSV. This sits just near the EGR. It is just in the top left corner of AlexV's picture.

If you look at the photo I took today of where I believe is the sensor port, after talking to the mechanic who did the job, and he walked me through where on the engine this is.

In the middle of the picture is a black rubber hose that goes into the aluminium inlet manifold horizontally held in place by a spring hose clamp. You cannot miss it as its underneath that round object with the triangle on the outside also fixed to the manifold.

That hose runs off to the left to underneath the little black box that sits at the front of the inlet manifold behind the radiator hose. The black plastic box is the MAP sensor.

[http://en.wikipedia....wiki/MAP\\_sensor](http://en.wikipedia....wiki/MAP_sensor) offers an explanation how these work.

To take this photo I had to take off the cover that surrounds the fuel filter and this is needed to get better access to this port anyway.

Apparently you undo the clip with a pair of pliers and poke an object in there like a Phillips head screwdriver to break the carbon and sludge that has accumulated there.

When the mechanic first put the engine onto the electronic management system, he found no vacuum whatsoever so he went straight to that and found it blocked which is a common problem on most engines (diesel and petrol) with EGR and the like. He said the Holden Vectra and Astra's are notorious for this.

In the 4JX1 engine the manifold gets quite filled or coated (sometimes excessively) with this sludge/oil deposit from the combustion process over time. Taking off the manifold is necessary and mechanically cleaning it is the only way but would be expensive and difficult. I suggest that from experience working with diesel engine operators in trucks, ships and mining equipment over half my life; that taking the vehicle for a drive under high load conditions of towing a heavy load uphill under extended periods in low gears and RPM's around 3,500 up to 4,000 may remove some of these deposits. High RPM's is not enough, the engine must be loaded. Under these conditions it is normal for the engine to smoke excessively. It does them a great deal of good and people are surprised what comes out of the exhaust.

The problem that causes these deposits in the first place is a combination of the EGR system that blows combustion by-products back into the inlet manifold from the exhaust combined with also low RPM or low load use around town. This causes a small part of the spent combustion charge to retreat back through the inlet valve into the inlet port and manifold and then stopping when the valve closes and settling onto the surfaces. Inlet gas speed is slower and cooler than exhaust gas flow hence these deposits forming. I have seen the backs of inlet valve completely caked in deposits almost blocking off the inlet port, thus affecting performance.

Sustained high load/high RPM operation cures a lot of this if the deposits are soft and oily but I have seen them hard carbon and can only be removed through immersion in carbon removing chemicals etc....

Yes mine is the same, I misunderstood what was being discussed. There is another small pipe behind the TPS which is connected to a PCV valve, this is on the pressure side of the turbo, Holden left this off when they did my injector recall!!!!!!

Checked my MAP sensor port on Friday and it was pretty gunky, gave it a clean, truck seemed to run better but I always think that as I only drive it on weekends.

AlexV's description is pretty accurate, my apologies for correcting you.

The MAP sensor is the little black box in the top right corner of Alex's pics, there is a pipe that runs from underneath it to just below and right of the EGR Valve.

As for the pipes on the air intake, I have the large (1" OD) that goes to the rocker cover, and a smaller (1/4" OD) that goes to the EGR Valve

Posted 30 September 2010 - 07:16 PM

Hi Jack, Know a little about the MAP sensor on this engine as I had to replace one about 18 months ago. When the original went bad the "check engine" light came up solid and the engine went to "limp home" 50% power mode (about 400 K from home). Did some research on the net and found a replacement non-genuine sensor in Vic at a injection specialist. May be able to dig up the info if you need it.

From what I understand and can see under the bonnet, one of them is the MAP the other is the EGR Pressure Sensor. I have attached pics to see what you all think.

Just from following hoses, to me it appears that the one next to the EGR is the the MAP, as it has a hose direct to the Manifold. The one under the manifold appears to be the EGR Pressure Sensor as it has a hose, which is 'T' off into the EGR and off to the EGR EVRV...

## INJECTOR SEALS:

Good article at: <http://forum.australia4wd.com/index.php?/topic/22839-injector-sleeve-repair-do-it-yourself-step-by-step/>

***Please be in injector seals and not the head! And 9 times out of ten it will be the injector seal.***

As I have said previously on this forum, this procedure should be in the maintenance manual for every 100 000km's for the 4JX1.

Basically, get the M16 Dynabolt as long as you can. About 150mm from memory. I welded on about 200mm M16 threaded rod to the threaded end. Then tightened up the dynabolt in the sleeve and used a 50x50 box section supported by some 4x2. Then used a nut & washer to screw it all up. Have a look through the forums and you will see some that others have done. Some say it may score the inner sleeve. I did not notice any marks inside, although am sure it is not the best method. (Cylinder 4 took a lot of attempts and it pulled out of the sleeve a few time)

The removal tool would be the easiest & safest but there you go.....

Remember to try to fill the oil rail up with oil before installing it back otherwise it takes a while to start.

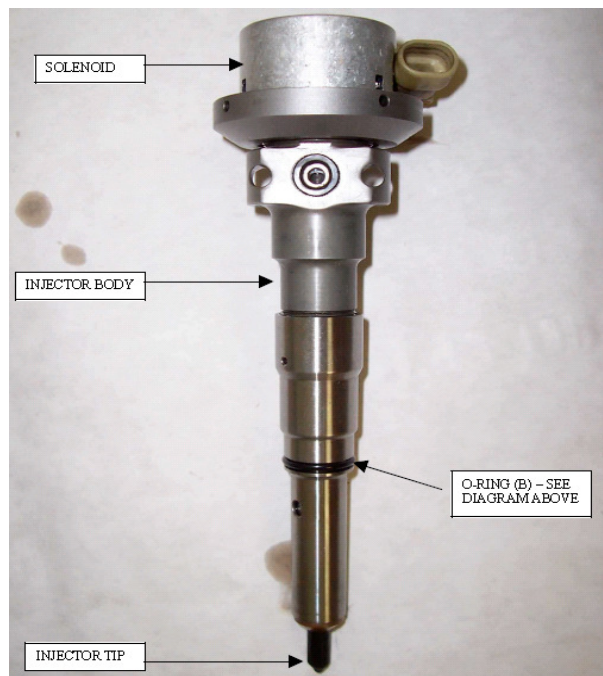
I did the oil rail pressure sensor and wiring loom while I was at it just for piece of mind and you are taking it all apart at the same time. (Not sure if you know about the dramas with these *parts*. If not, search the forum) The cost of all the items is not much and as it all came from Dubai, the transport costs made it all worthwhile.

Holden do a service kit think sleeves are \$80 each plus o-rings

## Injectors:

Clicking indicates the solenoids are working. How well they're working is normally decided on a test rig. Alternatively, it's trial and error. The injector internal O-rings and springs also need to be sound. These 3 types of parts are replaced in a kit for the CAT HEUI injectors for 100,000 - 150,000km services. Isuzu don't do a kit.

When you removed the original injector, was there any discolouration between the bottom O-ring and the copper "gasket"? Update for anyone interested....I replaced seals on the 2<sup>nd</sup> hand injector and reinstalled it this evening...did all the usual things, double checked everything, soon as I got oil pressure up she fired up and sat there idling like it was brand new...no smoke. Took it for a run...beautiful. Starts easily. I now have 3 spare injectors with new seals. Total fix cost \$100 for injector, \$45 for seals. Thanks for advice and help.



In measuring the HEUI internals, they seemed to have little wear in the metal parts. I would guess this is because they have light diesel fuel as well as heavier engine oil surging through their guts all the time. Also they're water cooled so remain at a constant temperature, rather than simply relying on the fuel temperature like in a standard common rail. This would indicate that the "reconditioned" injectors for sale have simply had new O-rings and springs fitted. The solenoid would have been checked if not rewound.

The CAT HUEI overhaul set is: solenoid + o-rings + spring. Their kit sells for about A\$65-85 per injector. Recommended interval between overhaul is 100,000km.

This is why I am fiddling with it. The Isuzu injector is a direct scaled down copy of a CAT injector.

**Hi Glenos,** After seeing it done first hand I would attempt it myself from now on. If you have ever taken off the intercooler and cylinder head cover insulator to get to the rocker cover your basically there. This involves a couple of steps including the removal of the throttle body flange, plus the air intake duct from the air cleaner box through to the turbo and the removal of a hose at the rear of the engine.

You can then remove the engine insulation cover and foam from the cylinder head cover and inlet manifold. This will then allow you access to the glow plugs. A narrow metal runner is bolted to the top of each glow plug, which needs to be removed first. Then you can remove each glow plug.

Mine came out quite easily, but the mechanic was very surprised and was expecting it to be a little harder. It is important the right tools are used here as the glow plugs are at an angle. A cheap socket set will not suffice, you need a higher quality socket set which allows you to remove the plug at an angle.

They also took the time to inspect the wiring loom near the throttle body and give it a good clean out. They re-attached it with a cable tie at an angle so the oil would no longer run down the wiring loom into the connector.

I was shocked at the amount of oil in the connector itself.

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## Glow plugs / Cleaning intake manifold:

Glow Plugs:

Anyone bought glow plugs from these guys? [www.dencodiesel.com](http://www.dencodiesel.com) \$85.80 for a set of 4. Much better than most stores Matt

Glow plugs Australia, I have asked him the question we all want to know the answer to "why are they so much cheaper then elsewhere, they seem to be the same product, "HKT PI-172" "

I finally bought some HKT plugs from the ebay guy, who is actually [www.sundiesel.com.au](http://www.sundiesel.com.au)

The electrode-tip came loose, as I tightened the nut on the bus bar it turned the nut at the top of the electrode, and pulled the electrode loose, the tip and electrode is one piece.

One the body came out without the tip, the tip was being held in by all of the carbon build up on it, due I think to the plugs not heating. I squirted some carby cleaner on it and gave it a wiggle and it came out, thank god.

I have one original plug that is stuck/broken in the head and it's staying there for now.

I seem to have a lot of carbon build up in my inlet manifold, I believe this is due to the oil coming through from the tappet breather tube, what can I do about it, do I need to do anything about it?

I've just put Bosch GPI-026 glow plugs in the jack, no problems removing the plugs just a pain having to remove the intercooler etc to get to them. As for the performance, I've had no problems since putting them in.

### Suppliers:

**SMS Diesel Spares:** [http://www.smsdiesel.com.au/main\\_pages/product-brands.html](http://www.smsdiesel.com.au/main_pages/product-brands.html) they have competitive pricing on many of the parts that I would have needed and were very considerate with returned unused parts.

**Glow plugs Australia** for help with cost effective glow plug replacements and genuine assistance with technical problems. [www.glowplugs.com.au](http://www.glowplugs.com.au)

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Symptoms of Glow plug problems:

I have not been happy with the performance since. Anyhow, I had the check engine light appear last night and was blowing some white smoke in the mornings until it reached operating temperature. ish.



[1] **White smoke** implies you have not yet got 4 working Glow-Plugs. Did you check the resistance was within spec [0.8 - 1.2Ω] AFTER installing the new Plugs? They're all supposed to be attached to a strong little bus-bar. Is THAT broken in some place - or is there a good electrical-connection at the bulkhead-end?

[2] **DTC #16** does, indeed, indicate a faulty **Oil-Temp-Sensor** - but it MIGHT just be that you've damaged the connector. The sensor itself is pretty robust! It's the sensor beside the ORPS, on the HP-Oil-Rail. All of those connectors are subject to heat and vibration and sometimes the locking-clips break-off.....! Some folk have re-attached the connectors with Cable-Ties!

[3] **DTC #74** is our old pal, the TPS - which, again, might NOT be faulty. Whether with a new TPS or an old one, the output-voltage seen by the ECM [measured at J1-18] varies with the MOUNTING-ANGLE of the TPS on the side of the Throttle-Body.

So, loosen the 2 mounting-bolts, set up the Voltmeter [between the ECM-connector-J1, pin J1-18 and Battery(-)] and turn the TPS until the voltage is about 0.85V - that's with the Ignition ON and the Engine OFF.

It does NOT require a Tech2, as the voltage can be read directly from the ECM connectors.

=====

### TOOLS for Job:

Torque Wrench capable of 17ft/lbs (23 Nm)

Number 3 Phillips, Number 3 Flat Blade, 3/8SD Ratchet Drive, 6" 3/8SD Extension, 1/4SD Ratchet Drive, 6" or greater 1/4SD extension, 10mm Socket, 12mm Socket, 12mm DEEP REACH socket, 8mm socket (1/4SD), WD40 / RP7 / CRC or similar, pointy nose pliers.

---

### Checking Glow plugs:

The other way to check my calculations for the resistance is:

$1/R_{total} = 1/R1 + 1/R2 + 1/R3 + 1/R4$  - this is for resistors in parallel

Seeing as the Glowplugs are meant to be 1 Ohm each,  $R_{total}$  comes out to 0.25 Ohm for 4 or in my case 0.33 Ohm.

Meanwhile, I measured the resistance on my existing ones, and they read: 0.9, 44, 630 and 47 Ohms, so I guess it looks like they need changing!

The only thing I'm worried about is snapping them when I try to remove them. I gave them a very tentative tug but none of them moved. So I've soaked them in WD40 and will leave it until I get my new ones for another go.

Some fantastic stuff on this site thanks! I found instructions for checking glow plugs and finally took the plunge today (minus the beer). Feeling a bit chuffed that it wasn't too difficult. Plug resistance was slightly higher than 1.00Ohms but all four were exactly the same (1.18Ohms).

I also checked the voltage going to the plugs which seemed to be lower than the suggested 12volts. I got initially 9.5volts that went up to 10.3 after around 20 seconds. I had the same results with the ECT Sensor connected/disconnected.

I never checked the ECT Sensor, what is the purpose of that on startup??

If all the plugs have a readable resistance in the order of 1 ohm and there is voltage supplied to the plugs my bet would be leaking copper washer on the injector letting diesel into the cylinder. There is also the possibility of coolant leaking past the sleeve that the injector fits into. cheers Dave I.

=====

Jack, My **glowplugs** were u/s at 100 k kms., but probably failed some time before that.

I suffered a gradual deterioration of starting, and had gone through the ritual of making sure the correct oil was being used, etc. .... I also fitted a non-return valve in the fuel line just upstream from the filter, as I had been advised an air leak could sometimes develop around the filter, leading to air ingress when stood overnight. A bloke in the UK told me this was yet another known (irritating) problem with this engine - the valve was only about \$20 so I thought nothing to lose. I also changed air and fuel filters. But poor starting continued and winter came.

The Jackaroo was in for the injector seal recall, so I got them to check the glowplugs - result all u/s. The front three were removed and replaced successfully, but the rear one was snapped off (Craig's current problem). I left the damaged one in situ and get by on three, as I reasoned much more serious damage could be done trying to get the broken plug out. I find it starts ok on three plugs and will remove the broken one when I am convinced a reliable method exists.

A warning to those who like to do things by the book. The Isuzu book that is. Three new glowplugs were totaled when they were tightened to the spec set out in the genuine Isuzu manual. 23Nm (17 ft/lb).

This spec is still in the current Isuzu update used by Holden.

23Nm isn't a lot of torque. As a comparison, spark plugs on the V6 are 18Nm and wheel nuts are 118Nm. At 23Nm, the tightness of the glow plug shouldn't be more than about 1/8th of a turn after it seated.

CraigS The supplier of the glowplugs said the maximum should be around 12 to 14NM. Said I should discuss with Isuzu.

I have been informed that the UK spec for the same motor is 15NM.

Posted 05 January 2007 - 03:13 PM

I put some nickel based grease on the threads when I put them in, don't know f it will help with later removal, they must get bloody hot in there. glenos

---

## 12. Cooling/ Water System/Heater/Coolant:

### Radiator:

Natrad have both radiator cores available in aluminium or brass, the aluminium core was very efficient. Use thicker than 25mm if replacing

The workshop manual doesn't specify an interval for replacement. It does specify that coolant concentration should be checked every 10000kms.

It depends on the **coolant** being used. My V6 is now using the orange dexcool type coolant for aluminium radiators and alloy engines. It is supposed to have a 5yr / 100000km life, but I'll replace it every 50000km or 2.5yrs regardless.

More often is better, so 40000km would be a good move.

---

### Coolant:

Sorry Jack, can't answer that question...

The owner's handbook states that the coolant conforms to specification number HN2217 and should be 50% coolant, 50% water. I found some Nulon long life coolant at Supercheap Autos that conforms to that specification and also specifically says that it is suitable for diesels so I reckon it is the sort of coolant AlexV is referring to.

ack, Ensure you replace the coolant with a Diesel specific coolant, preferably based on OAT (Organic Acid Technology) like most diesel trucks now use like CAT, Cummins, Mack and other Jap engines use etc.....

You can buy an Anti-Freeze type or basic type but go hunt around for a proper Diesel engine coolant and dilute with water at least 50%. The larger truck parts places or the more reputable car parts joints may have this product. Or the truck stops where they sell diesel fuel.

Castrol, BP and other oil companies market it so you can check with their agents. It is even sold pre-diluted to 50%. I bought a 20 litre of **SUPER ROO SR400 EXTRA LONG LIFE COOLANT** concentrate that is mixed at 50% with water.

#### **Product Name - SR400 Extra Long Life Coolant Concentrate**

Description - Is a universal ethylene glycol based anti-freeze coolant concentrate (contains 1060g/liter ethylene glycol) incorporating an advanced formula technology with virtually non-depleting organic acid corrosion inhibitors. SR400 is silicate free for improved pump life and contains no harmful nitrates,

borates, phosphates, amines or nitrites. SR400 satisfies or exceeds all major standards and is recommended for major European, Japanese and USA gasoline, diesel and heavy duty wet sleeve diesel engines.

**Supplier:** Quinlan's Auto Spares PTY LTD, 325 Townsend St, Albury S NSW 2640, Australia 02 6021 5311

SR400 can be added to the cooling system as top-up adjustment of freeze point of the cooling water.

Product Benefits - SR400 can be used in most OEM diesel, petrol and natural gas engines allowing one coolant to be inventoried. The product lasts up to 3 times as long as conventional coolants. Reduces engine coolant cost up to 60% over conventional coolants. The recommended maximum service interval without pre-charging or recharging is 500,000 kms, (or 5 years) at a 50/50% mix, for on-highway diesel truck engines and 5,000 hrs for off-road equipment and commercial engine applications.

[http://superroo.com.au/SR400\\_Extra\\_Long\\_Life\\_Coolant\\_Concentrate.htm](http://superroo.com.au/SR400_Extra_Long_Life_Coolant_Concentrate.htm)

Don't put normal off the shelf petrol engine stuff, it won't protect the unique operating conditions of a diesel. This is necessary to ensure that electrolysis does not eat the cylinder sleeves on the water side. Electrolysis (Cavitation Corrosion) for those who haven't heard of it, occurs due to the high compression in a diesel causing the bores to "pant" in and out momentarily during the point of combustion, or expand causing air bubbles to form on the sleeve eating off a bit of metal at a time, until you get compression and/or water leakage into the cylinder or exhaust into the cooling system. Either way your engine needs a rebuild.

=====

#### **HEATER leaks [under Dash]:**

Both pipes where they go into the heater matrix are plastic, see photo attached. Did this job several months ago myself, yep time consuming s#\*t of a job. I had to let the gas out of the air con to get the a/c box out to get to the heater element.

Had to pull most of the dash apart to get at it because of where the heater sits and the way to get it out. All I can say further is have fun. I did find a radiator place in Canberra I think was the cheapest place to source a new core. I wasn't going to put a 2<sup>nd</sup> hand 1 in that could break as well soon down the track.

***After checking try Autoheat in Canberra. Ken***

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#### **Faulty "O" Ring rear head:**

***Correction Page 23 contains a mistake: there is no fuel pressure switch at the back of the head. Just orifice. Small rectangular unit is a housing for fuel temp sensor, orifice and a metal pipe to connect a fuel return line.***

Of one more explanation about o-rings at the sleeves and possible reason of their damage.

It could be overheating. Not a big overheating, that comes before cracks in the head, but small regular overheating every time your start the cold engine.

Place:

The reason for this could be a faulty (or just old) O-ring at the L-shape metal coolant pipe, going from the block of the engine to the head. At the block side its flange is bolted by 2 bolts m10 size, and at the other side its just pressed in the head. This L-shape pipe is located under the air conditioner pump holder, about 100-mm long, about 15-18 mm in diameter.

Reason:

Due to temperature changes head and metal pipe are expanding and compressing the o-ring. After cooling down the rubber o-ring returns to initial shape. By the time rubber becomes like a plastic and water starts leaking out(sometimes invisible from outside) and the air starts coming in, creating an air bubble in the gallery of the head, around injectors and sleeves. When the engine is started it takes some time to fill up the gallery with coolant and all this time injectors are working heated from combustion chamber.

### **Diagnostics:**

At the beginning stage

Place the inner car heater temperature handle to max hot. Switch off the fan and radio. Start the engine and listen to the sounds near glovebox area. If you hear sounds like water murmuring that means the air bubble was there. Repeat the test next morning.

---

At the escalated stage:

Park a car with a warmed-up engine at an angle to the front. Front side should be lower than a back, in my case 150mm of difference was enough.

Stop the motor and wait for 2-10 min, you will see coolant drops under the car coming out pretty fast.

### **(--Or just do a pressure test --)**

How-to-fix: Take out aircon pump, aircon pump holder, belt tensioner. Unbolt L-shape pipe and pull it out. Replace the O-ring.

App time about 3h cleaning everything under aircon pump included.

That's what I did yesterday after I got a spot of coolant under the car.

A bit of measurements:

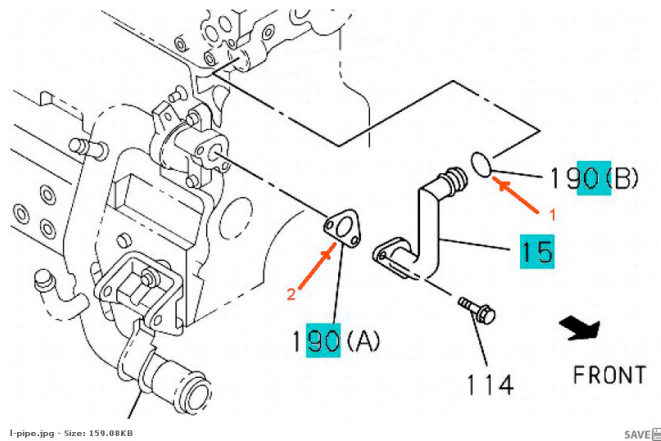


Old o-ring dimensions. Inner D =20mm, Outer D~25, H=3.5mm

I've tried to fit a replacement o-ring (from Bunnings) with Inner D=19 and Outer D=26 it was very hard and I decided not to force it in.

A little bit smaller from the same plumbing o-ring kit (\$2.50 for a lot of them :-)) fits well. But few weeks later it will be replaced with a genuine one, of course. Or a viton one, if I'll find an equal replacement and it will pass my tests

I replaced most of the hoses with genuine, as several hoses involve sharp bends, etc.. Bear in mind, mine



had lasted for 10 years, which I think is extremely good.

However, some of the coolant hoses are no longer available from Holden - these just happen to be the straight ones and most are relatively easy to get at, where cut lengths of generic hose can be used. That little hose is definitely in the "tight bend, very difficult to reach" category and I would advise using genuine.

#10 [Big Coolant Leak: post #10] jacksdad

Posted 22 September 2011 - 07:49 AM The same hose went on my trooper, got a new one next day from my local Isuzu dealer, cost about £5, what a total ##### to change....its easy to fit onto the oil cooler, but I could not get the fixing clip onto the engine block end!

I took off the intercooler and intake pipe, turbo shroud and battery, then I could just about get to it...

<http://forum.australia4wd.com/index.php?/topic/27763-nb-one-more-very-important-o-ring-to-check-and-fix/>

## Water pump:

The water pump went a couple of years later at around 215,000km.

That cost me \$246.50 from SMS Diesel Spares here in Sydney.

suzu, on 22 Jan 2008, 08:21 AM, said:

Are they sure it's the water pump? Reason is I have never had to change one yet in 10 yrs of working on them, the common mistake over here is people think it's leaking when in fact it's the small gold coloured bypass pipe just to left of it. It seals in the head with nothing more than an o ring which has a tendency to go hard and then leak and because it's surrounded by the sound deadening this soaks it up so you can't really see where it's coming from.

Is this the pipe below the A/C compressor?

It is just under the air conditioner bracket the bottom bolts on just above the adjuster rail for the alternator and the top goes in to the corner of the head.

I've replaced these o-rings twice, actually last time I just got a pack of o-rings found 2 that fitted nice and tight and silicone it in.

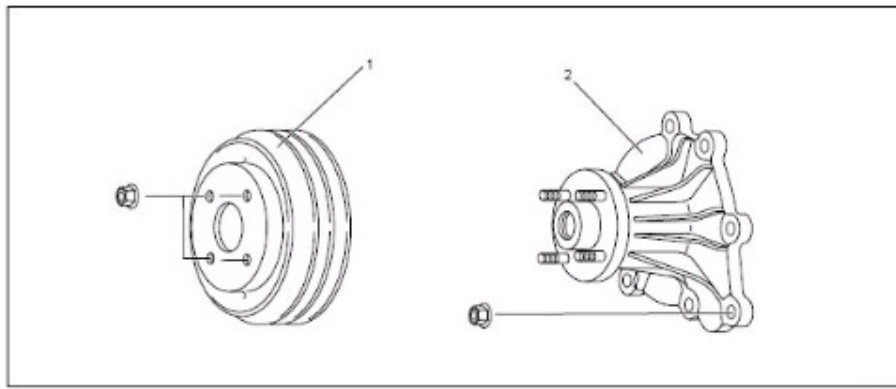
Hi Suzu The original water pump leaked through the shaft seal. When I took it off and turned the shaft the seal squeaked and coolant had been leaking out of the housing drain hole. No leak from the pipe you mentioned.

I could not believe my luck when the replacement pump did the same thing. This time it was weird that the coolant also leaked out of the outer bearing also. Holden only reimburse the cost if the part is faulty - which they did. The second replacement has been fine, no loss of coolant no leaks at all.

---

## ON-VEHICLE SERVICE

### WATER PUMP



#### Legend

- (1) Fan Pulley
- (2) Water Pump Assembly

#### REMOVAL

1. Drain coolant.
2. AC Generator Drive Belt
  - 1) Loosen AC Generator mounting bolt, adjust plate lock bolt, and remove the drive belt.
3. Cooling Fan Assembly
  - 1) Remove lock nut and take out cooling fan assembly with cooling fan clutch.
4. Water Pump Assembly

#### INSPECTION

Make necessary repair and parts replacement if excessive wear or damage is found during inspection. Should any of the following problems occur, the entire water pump assembly must be replaced.

- 1) Cracks in the water pump body
- 2) Coolant leakage from the seal unit
- 3) Excessive play in radial direction or abnormal noise
- 4) Excessive play in thrust direction
  - Limit : 0.2mm (0.008in) or less
- 5) Cracks or corrosion in the impeller

#### INSTALLATION

1. Gasket
  - 1) Set gasket to gear case.
2. Water Pump Assembly
  - 1) Install water pump assembly, and tighten to specified torque.

Torque: 20 N·m (2.0 kg-m/14.5 lb ft)

#### 3. Cooling Fan Assembly

- 1) Install cooling fan assembly, and tighten to specified torque.

Torque: 8 N·m (0.8 kg-m/5.8 lb ft)

#### 4. AC Generator Drive Belt

- 1) Install AC Generator drive belt and adjust belt tension.

Torque: 40 N·m (4.1 kg-m/29.7 lb ft)

For ACG to bracket

20 N·m (2.0 kg-m/14.5 lb ft)

For ACG to adjust plate

5. Fill coolant to specified capacity.

### 13. Sensors and Returns:

Ok, after cutting THE [white] wire codes are:

Fault Type	Codes
Inj #1 fault	51
Inj #2 fault	52
inj # 3 fault	53
Inj # 4 fault	54
ORP High Voltage	62 DTC P1196 = Rail pressure system high warning..
Oil system high warning.	P0192 (Flash 63) Rail Pressure Sensor Low Voltage P0193 (Flash 63) Rail Pressure Sensor High Voltage
Rail Pressure System Low Voltage	DTC P1194 (Flash 61)
Rail Pressure System High Voltage	DTC P1195 (Flash 61)

---

#### Multi plug connector:

When the loom is unplugged, oil in the plug, means the harness is wicking, and the oil creates cross talk too and from the ECM, and its only going to get worse

I would recommend changing the harness as well as the ORP's

---

## 14. ORPS [Oil Rail Pressure Sensor]

Some reading: <http://forum.australia4wd.com/index.php?/topic/18628-rail-pressure-control-valve/>

Since the engine will run when the ORPS wire to the ECU is cut and you have replaced the ORPS it would appear that the ORPS is either not getting the correct 5V voltage or GND voltage to it. Can you do a flash code test to see if there are any of the following DTCs set?

DTC P0192 (Flash 63) Rail Pressure Sensor Low Voltage

DTC P0193 (Flash 63) Rail Pressure Sensor High Voltage

DTC P1194 (Flash 61) Rail Pressure System Low Voltage

DTC P1195 (Flash 61) Rail Pressure System High Voltage

Flash code diagnostics can be used to read active codes and to determine if history codes are present but cannot be used to clear codes or read history codes. Flash code diagnostics is enabled by grounding by terminal 4 shorting to terminal 13 of the DLC connector with the ignition switch "ON". Grounding terminal 4 of the DLC connector. (see documents below).

Attached File Reading Flash Diagnostic Trouble Codes.pdf 70.49KB 2 downloads

Attached File Rail pressure system low or high voltage.pdf 89.06KB 1 downloads

Attached File Engine cranks but won't run.pdf 69.67KB 3 downloads

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### **The White Wire** [*ORPS wire to the ECU*]:

The wire chaney is on about is the white wire in the big multi plug next to the dipstick this will bypass the pressure sensor if it starts then the sensor is at fault if not then chances are the control valve is stuck open.

---

\*\*\*\*\* The oil pressure sender under the tappet cover has a loom attached to it. It seems that the oil seeps out of the sender and down in the loom and affects the plug by upsetting the readings to the computer. Ours started out by running rough for a few seconds the first time and then clearing itself..just like a small trace of rubbish in the fuel.

Second time..would start but only run at about 700rpm at full throttle..turned off ...would'nt restart..rang mechanic and talked for few minutes...tried again..started perfect. No problem for a few weeks then would stop on way to town..wait a minute ...starts...no problem. Pull off fuel filter...water in fuel...drain tank...should be good...week later same thing..dealer decided to look further...check fuel wiring harness...oil in loom ...replace sender and loom...around \$600..thanks.

\*\*\*\*\* You can easily check the harness - it comes out on the left hand side of the rocker cover, and joins a connector block at that level (it's easy to find). If it is playing up you will see oil coming out of the connector block, or you can open the connector and have a look inside there will be oil there if this is your problem. From memory the cables were red in colour.

When they replace the harness, the cables will be pink - they told me this component has been redesigned to prevent this happening again. It cost me \$500 to replace as (again from memory) it controls a fuel pressure valve, which will need to be replaced. If this is this case, do not muck about trying to do temporary repairs, as it may affect your spray patterns and cause flame impingement on your pistons - not good with alloy gear!

Anyway, pulling out of the drive last week, as soon as the car went over the hill and was pointing downhill, the engine speed suddenly dropped back to idle, regardless of throttle pressure. The engine did not stall, but would not rev up beyond idle, so I came to a gradual stop, engaged reverse and slowly crawled back to the shed front for a think.

\*\*\*\*\* After a cuppa, I remembered a wiring connector that I've long thought, 'didn't look right'. With the engine again idling, I found I could make the engine speed up (slightly, but noticeable) by moving the connector block which is located next to the oil filler cap! Very strange, so I stopped the engine, pulled it apart and found it coated with oil, so I cleaned it with electrical contact cleaner and no problem since. There is some oil around the intercooler outlet pipe which I think had got into the connector and perhaps caused a stray electrical path which I think effected the wire throttle response. As added insurance against the risk of a short circuit, I also used cable ties to support the connector away from direct contact with metalwork.

I've also been concerned about a tight bend in this wiring loom upstream a few inches towards the engine, and meant to check it for a while. Today I pulled the connector apart again, lifted the wiring and found the insulation had worn away badly (not quite through) through contact with a corner of the engine. Fortunately, there was no exposed copper, but there certainly would have been in time. I carefully cleaned the wiring, wrapped with insulation tape and the then spiral wrap. I also rerouted the wiring slightly to avoid the tight bend.

Engines now runs as smoothly as ever, no hesitation and correct throttle response.

Thanks Red-one, I checked my plug as soon as i read your post and sure enough full of oil. Cleaned it out and she runs better than ever ( only had her two weeks). As for the wiring already done all good.

\*\*\*\*\* Once the wiring insulation is worn through, giving a possible earth path, any change of direction such as going up or down a hill, starting or pulling up (eg at traffic lights ???) could cause the wiring to move slightly and in some cases cause intermittent symptoms. My theory anyway !

When I had the problem, I found I could make the revs change just by moving the wiring around with my fingers.

\*\*\*\*\* My connector sometimes still gets a little oil in it - I just clean with electrical contact cleaner, but so far I haven't needed to replace the loom ..... nor have the funny throttle response symptoms returned.

My problem is fixed!!! Well after the check engine light was coming on and all, and experiencing the same problems as husky, the car finally refused to start. Luckily I had already ordered a RPS, so it was waiting at Holden for me (\$223). Oh yeah, no matter how much contact cleaner I used, it made no difference for me :-( Anyway, a few hours of pulling apart, reinstalling etc later, and at least 1 min of engine cranking to build up pressure in the oil rail (it all drained out changing the RPS), she fired back into life. You could probably do it a bit faster then a few hours, but I took my time to make sure every little thing was clean and 100% correct.

\*\*\*\*\* Replaced oil pressure sensor, injector solenoid wiring harness, and sealed the head back.

First click and it went. Its been a week now and is still going strong. Hope you get you truck back on the road soon. Cheers, MMR

=====

ORPS - Posted 31 May 2008 - 11:23 PM

If the ORPS is faulty, I believe it will set an error code, but only if it has gone belly up. If it is on the way out, it may not set a code, but using a TECH II I think you can watch the output and see if it is in range.

If you replace the ORPS, then yes you need to get a TECH II and calibrate the ECU to the new sensor. It will start and run though without doing this, but things will not be at their most efficient

It should be calibrated with the tech2, it will run but not to it's optimum. It's like giving an engineer something to measure and him not zeroing his measuring device so from that point on all his measurements will be out slightly. This could lead to over or under fueling and on this type of engine that's not good.

It does need to be coded to let the ecu know where the zero point is, it's like when an engineer measures something they will always zero their measuring instrument so that it gives an exact reading well this works on the same principle.

As far as I know it's not a learning ecu there is no knock sensor to pick up pre detonation or pinking so it won't know to retard the injection. It doesn't use the cam sensor when it's running either so it only uses the crank to know when to inject and the **ORPS** to know how much to inject along with the pedal position sensor.

Well I have had my rail pressure sensor calibrated by our dealer. All though they said the reading from the sensor did not change when it was recalibrated the vehicle now starts better with virtually no smoke and the idle quality is far better.

=====



Has anyone had their motors nearly run but just wont fire up? When I cut the white wire (orps) it runs fine but as soon as I replace it she wont run just nearly gets there but wont go. I have replaces the orps, injector seals, tps. I tried to compression test it and broke 3 glow plugs so I took the head off removed the broken ones and fitted it back up. It has very small crack in the glow plug hole of 3 cylinders but I don't know if that would be causing my problem, as the compression is fine.

When it runs I get 2.7 volts at the white wire (orps) - It doesn't blow any smoke.

Hi Edco - You really have to examine CAREFULLY what Nathjack is saying! As you quoted "When I cut the white wire (orps) it runs fine but as soon as I replace it she wont run just nearly gets there but wont go!" The phrase "nearly gets there but wont go" actually points out that it's TRYING TO START - and NOT trying to CONTINUE to run!! In a later comment, he wrote "It continues to run after I plug it [the ORPS] back in" - which means the ORPS is OK and ALL would then be well if the ECM could successfully control the pressure in the Oil-Rail in proportion to the Pedal-position. It can't 'cos the ORPCV is NOT responding.

Therein lies the BIG DIFFERENCE - When actually running, it'll plod along with barely enough pressure to fire the injectors - but at STARTUP - the ECM will 'forbid' the injectors to fire if the signal from the ORPS shows too low Oil-Pressure. Cut the magic white wire and it'll go - but very badly - 'cos the REAL pressure is still too low!

I pulled apart the orpcv it all appears ok gave it a good clean, put it back together and still no luck it still runs fine with the orps wire cut . When I stop the motor and plug the orps wire together it will try to start and just idle along very slowly with no throttle response. When its running I get between 2.7 volts at idle and 2.9 volts at 2000rpm from the white wire so to me it seems like the oil is being controlled fine and I am getting a signal back to the ecm . I have 5 volt supply to the orps, I will put a test light from the battery and check the earth circuit tomorrow.

It is a cheap ebay orps as well!! Would be great if someone could check their voltage at the white orps wire. Nathjack

## Calibration ORPS:

Posted 05 February 2010 - 07:14 AM. I fitted a new orps to my Jack and took it to a Holden dealer to program the computer for it. After going through the tech 2 they told me it wasn't necessary and the tech 2 hadn't a program to do it. This is the extract from the service manual, which says it must be done, and the procedure to follow to do it.

Rail Pressure Sensor Programming - Rail pressure sensor replacement must be programmed.

This programming needs Tech-2.

## Programming Procedure:

- 1.Connect Tech–2 to vehicle DLC.
- 2.Turn Ignition Switch to the “ON” position.
- 3.Select “DIAGNOSIS” from the main menu.
- 4.Select Programming.
- 5.Select Oil Pressure Sensor change.
- 6.Execute Oil Pressure Sensor Program.
- 7.Confirm the completion of Oil Pressure Sensor Program.

I went through the operation with their technician and the tech 2 had no selection for oil pressure sensor change so what’s the real answer here, does it need it or not, Jeff

---

## **Rail Pressure Control Valve - *RPCV***

JackDriver, on 15 Feb 2013 - 10:57 AM, said:

Hi guys,

Been playing with my newly acquired Tech2 smile.png and noticed that at idle the 'Rail Oil Pressure' fluctuates between 3.9Mpa to 4.5Mpa when the 'Desired Rail Oil Pressure' is 4.0Mpa. During this time “Rail Pressure Control Valve” stays fixed at 19%. hmm.png

I'd like to know if anyone else with access to a Tech2 has seen this fluctuation. Is it normal or does it indicate a problem like dicky ORPS or sticky RPCV.question.png.

I also noticed that when turning the engine off the 'Rail Oil Pressure' drops immediately to 0.5Mpa and then gradually falls lower and lower to be at 0.2Mpa within 30 seconds. Again I'd like to know if this is normal or whether it indicates a leak in the oil rail somewhere like maybe a faulty check valve or failed O-ring.

Any ideas? unsure.png

Cheers, JackDriver

Oil rail pressure is controlled almost entirely by the ECM, which uses the ORPS to monitor Fuel Injector output and the RCPV to control it. Pressure in the common rail provides a "head" to drive the injectors and is one mechanism that the ECM uses to correctly meter fuel to the cylinders.

Very short digital "steps" to achieve this pressure control the RCPV. All computers use a high frequency rate of short "jumps" rather than a smooth analog flow. The RCPV has a fast acting piston in it to do what the ECM tells it.

The RCPV piston becomes varnished with deposits as time goes by. It is inevitable that the reaction time of the piston is reduced. This will cause some binding of that piston, so the "steps" in pressure will be larger than the new device. This will likely be more noticeable at idle since the % difference in the jumps looks higher than when compared to total oil flow through the pump at higher rpm. While a common rail injection system produces full pressure from very low rpms, there is still a "ramp up" in pressure off of idle. Therefore normal wear in the injector system will likely show up at rpms' near idle first since that is the only time the Common Rail is not at full oil/fuel pressure. This is normal. An engine is new only once, and so it's "normal" condition is to be wearing out.

There will be a range that the ECM will consider serviceable. If the RCPV's response is within tolerance, but slowing, the ECM will simply pick up the time the Fuel Injector fuel tip is open. At some point the RCPV will slow enough to trip an error code.

It is unlikely that a "jerky" response at idle would do anything more than produce a less smooth idle. As the engine speed increases the ECM will take up any slack. This is one advantage of a computer-controlled engine - it re-tunes the engine as it wears for optimum performance.

### **Cleaning the RCPV:**

If this phenomenon is of concern, the solution is to clean the RCPV. It is a delicate device and cleanliness should be observed. The device can only be cleaned in an ultrasonic cleaner which will delicately but thoroughly clear all unseen interior passageways as well as those surfaces seen. A small ultrasonic cleaner (2L )can be purchased on ebay for \$75.

However, if the engine is running smoothly at idle the risk of damaging the RCPV valve during cleaning is too high in my opinion. Perhaps the best indicator is fuel consumption.

Edited by chilby, 20 February 2013 - 10:11 PM.

+++++

## **ECM - Engine Control Module**

The ECM is the Engine Control Module - which is a fairly robust computer dedicated to managing the timing and length of the injection-stroke [fuel input] and the oil-pressure in the Rail [hydraulic power to the injectors] etc.

You shouldn't mess with the ECM beyond making sure that all its connectors are clean [they can get oil seeping-into them!] and dry and making good solid electrical-connections.



DTC using a Tech 2	Flash DTC	Description	MIL
P0107	34	MAP Sensor Low Voltage	ON
P0108	34	MAP Sensor High Voltage	ON
P0112	23	Intake Air temp Sensor Low Voltage	ON
P0113	23	Intake Air temp Sensor High Voltage	ON
P0117	14	Engine Coolant Temp Sensor Low Voltage	ON
P0118	14	Engine Coolant Temp Sensor High Voltage	ON
P0121	33	Accel Position Sensor Rationality	ON
P0122	21	Accel Position Sensor Low Voltage	ON
P0123	21	Accel Position Sensor High Voltage	ON
P0182	15	Fuel Temp Sensor Low Voltage	ON
P0183	15	Fuel Temp Sensor High Voltage	ON
P0192	63	Rail Pressure Sensor Low Voltage	ON
P0193	63	Rail Pressure Sensor High Voltage	ON
P1193	64	RPCV Circuit Open/Short	—
P1194	61	Rail Pressure System Low Voltage	ON
P1195	61	Rail Pressure System High Voltage	ON
P1196	62	Rail Pressure System High Warning	ON
P0197	16	Oil Temp sensor Low Voltage	ON
P0198	16	Oil Temp sensor High Voltage	ON
P0201	51	Injector #1 Circuit Fault	ON
P0202	52	Injector #2 Circuit Fault	ON
P0203	53	Injector #3 Circuit Fault	ON
P0204	54	Injector #4 Circuit Fault	ON
P0217	22	High Coolant Temp Warning	ON
P1217	36	High Oil Temp Warning	ON
P0219	11	Engine Over Speed Warning	ON
P0336	43	Crank Position Sensor Out of Syncro	ON
P0337	43	Crank Position Sensor No Signal	ON
P0341	41	Cam Position Sensor Out of Syncro	ON
P0342	41	Cam Position Sensor No Signal	ON
P0380	66	Glow Relay Circuit Open/Short	—
P0381	67	Glow Lamp Circuit Open/Short	—
P1403	32	EGR EVRV Fault	—
P1404	31	EGR VSV Circuit	—
P0405	26	EGR Pressure Sensor Low Voltage	ON
P1405	37	EGR EVRV Circuit Open/Short	—
P0406	26	EGR Pressure Sensor High Voltage	ON

## ECU – Electronic Control Unit

At idle the ECU adjusts the Oil rail pressure control valve until it sees a voltage of approx. 1-volt from the ORPS.

As you crack the throttle open the ECU gives a very short burst of full pressure injection where the ECU wants a voltage of around 4.6 volts until the boost starts to rise and the ECU cuts back the injection pressure to what is needed under its mapping program.

At a constant 80 km/h on flat ground my car shows a voltage of approx. 2.4 volts.

At a constant 100 km/h on flat ground it shows approx. 3.0 volts.

Under full throttle the ECU varies the pressure up to approx. 4.6 volts depending on current boost etc---

Boldjack, I believe you are right about the Brake Lights and the ECU being on the same circuit, alas all fuses, relays and especially the brake lights were checked very early into this, with NFF.

## High pressure Pump:

Hi Mattsjack,

Diesels like the 4JX1 do not generate vacuum from the inlet manifold, as this is mostly under positive pressure, not negative as in a petrol motor. Instead a diesel have a dedicated vacuum pump which, in the case of the 4JX1, lives under the high-pressure oil pump and is driven directly from the timing gears.

timing gear.jpg

ISSUES:

- Leaking injector tube seals
- Faulty ORPS
- Wrong engine oil type
- Dodgy oil filter for the high-pressure supply side.

## TIMING/ High pressure Pump + Replacement Timing Belt:

The timing of the fuel pump is actually irrelevant since the 4JX1 produce the high fuel pressure in the injector itself by means of a hydraulic piston driven by high-pressure oil under the control of the ECU.

Now it happens that the fuel pump is driven directly from the High Pressure Oil Pump (HPOP) which is turn is driven directly by timing gears from the crankshaft. A pulley on the HPOP then drives the camshafts via the timing belt. If the timing gears have never been interfered with then the timing of the HPOP must be correct.

Unfortunately the timing marks on the HPOP do not align with every rev of the crankshaft and therefore the engine may need to be turned a number of revs before the timing marks on the HPOP are aligned. I found this out when I first replaced the timing belt on my Jack.

However, it is true that when the timing marks on the HPOP are aligned the timing marks on the camshaft must also be aligned, PROVIDING that #1 cylinder is at TDC.

To check that #1 cylinder is at TDC you also need to look at the timing marks on the crankshaft pulley. Unfortunately this is very difficult to see. In fact to see it you must first remove the sound cover that surrounds the crankshaft pulley. The mark can then be seen as a small cut across the rear most edge of the pulley.

For piece of mind I would follow the advice in the manual which states to rotate the crank at least two turns after fitting the new timing belt to ensure that the camshaft is correctly timed. After rotating the crank twice, loosen off the tensioner bolt to allow the tensioner to find the correct tension, then retighten.

Having another look at the photo you posted it looks like you probably didn't have the crank exactly at #1 TDC, unless of course the timing gears have been interfered with. To determine if the timing gears are out, rotate the crank at least six times, stopping at #1 TDC each time. On at least one of these rotations, the timing marks on the HPOP, crankshaft and camshaft should all be aligned.

**PARTS:** Just replaced my timing belt today. It was a fairly easy job. The old belt was in good condition seeing that has been going around for 180000km. The tensioner bearing was a little dry so I added a little grease.

This is easy to do just pop of the seal, add grease and replace the seal. Having a good look at the bearing and roller, it looks like the roller is shrink fit over the bearing. I think it would be possible to replace the bearing with a little bit of effort. The bearing is a NSK B35-139DWA1 also the air con belt adjuster roller bearing is NSK 6203DUL1 (had to take it off to get access to the timing belt cover). Timing belt was Gates T312 at \$45

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Posted 19 April 2013 - 04:07 PM As timing belts go this is 1 of the easiest. Remove air intake pipe, alt. & a/c belts, wire 4 cam angle sensor, plastic timing belt cover. If you're replacing the oil seals behind the pulleys loosen the retaining bolts now. With a socket on the front pulley nut turn engine over until timing mark on top timing belt pulley lines up. Check timing mark on crankshaft pulley should be lined up on tdc. Remove the timing belt tensioner . Once you get the cover off it's all pretty obvious anyway.



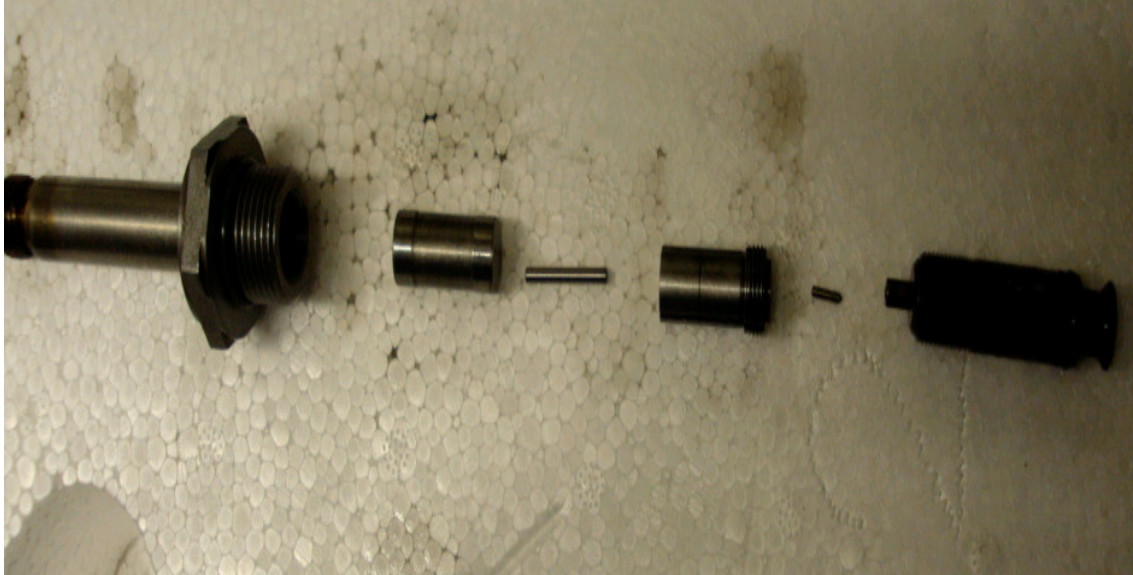
When you've replaced the belt & fitted the tensioner it's spring loaded but I usually give it a bit more tension while tightening it up. Once your done recheck timing marks then turn engine over 2 revolutions with spanner (this makes sure it's all good & valves aren't hitting) recheck belt tension.

Done this from memory so hope I haven't forgotten anything. Cheers Graham

Posted 20 April 2013 - 12:18 PM Did mine a few months ago, and the only problem I had was seeing the timing mark on the crankshaft pulley. Couldn't see it at all from above. Climbed under the car and could see it ok from underneath, so I extended the timing mark around the pulley with some liquid paper, and all fixed. Apart from that the job was pretty easy.

Posted 21 April 2013 - 01:49 PM Do have any oil leaks from the HP oil pump seals. If so then now is the time to look at changing the o-rings, as you're half way there.

## 15. PCV Valves:



Posted 27 August 2013 - 12:50 PM Hey AaronJack,

Just purchased a RPCV (P/N 89 7174 8720) from Ibrahim at Ramin Auto Parts in the UAE. Good bloke to deal with and got the parts within a week. Cost was \$US205 plus freight. His contact details:

Ramin Auto Spare Parts Trading P.O.Box 30199 Dubai, United Arab Emirates Tel. +971 4 2670081 Fax +971 4 2671502 Email : [raminaut@emirates.net.ae](mailto:raminaut@emirates.net.ae) Web : [www.isuzuautopartsstore.com](http://www.isuzuautopartsstore.com)

Cheers, JackDriver

## Injectors:

It is also suggested you replace the copper washer every 100-150k it as in CAT HEUI diesels and 4JX1's in Russia as maintenance item. Saves time later down the track.

## Oil Rail Pressure Meter

CTIs Oil Rail Pressure Meter is a diagnostic tool designed to verify the oil pressure in the injection system of Isuzu 4JX1 3.0 Litre Turbo Diesel engines. The Oil Rail Pressure Meter can be retrofit to any existing vehicle using the 4JX1 motor in approximately 1 hour by someone with handyman skills.

Rough idling, long starting crank cycles or your engine not starting are all tell tale signs that your Isuzu 4JX1 engine has compromised components in the hydraulic system. Our Oil Rail Pressure Meter can help in identifying which components are faulty or failing based on the oil pressure readings at different engine states.

Under normal driving conditions the Oil Rail Pressure Meter readings should read between 1.00 and 3.50. Should the meter readings fall outside of these parameters (for normal driving and no noticeable change in performance) it is possible that the oil rail sensor is faulty.

With a cold engine and the cam angle sensor disconnected, cranking the engine should give a reading above 1.20 (depending on oil temperature, battery condition, type and grade of oil used). Note that the engine will not start with the cam angle sensor disconnected.

Under normal operation, if the Oil Rail Pressure Meter reading does not reach 1.00 the engine will not start.

Likely causes are:

- HEUI pump control voltage missing (reading should be approximately 10.00 or more)
- Loose connection (oil leak) on an injector or associated hydraulics
- Low oil in sump, and/or
- Air leak in the pickup for the hydraulic priming pump

***If the Oil Rail Pressure Meter reading is above 1.00 the engine will not start. The problem is most likely associated with other ECU inputs:***

- Cam angle sensor
- Crank angle sensor
- Fuel pressure switch, and/or
- Other electronics

CTIs Oil Rail Pressure Meter can also be used as an economy fuel gauge for Isuzu 4JX1 engines by driving with oil pressure readings below 2.5.

I think buying a Tech2 and reading the Isuzu manual is the correct translation. There are so many hoping to cash in on the fear of the 4JX1.

It's a simple system. The oil that drives the injectors is held at the right pressure by the ORPS and the RPCV. The Oil Temp sensor is a bit of a fine tune for oil viscosity.

The wiring harness needs a clean at 240,000km intervals. After that the ECM does all the work. Period.

Change the sleeve seals and copper washers at the same intervals as a CAT diesel - 100,000km. Buy a Tech2 for \$400 lousy bucks and learn to read it. Then be assured you have the same super reliable, super economical, super long lived Isuzu diesel as in all the trucks I've owned.

### **Starting after replacing injector O-rings:**

You need a fully charged battery to get oil up into the common rail and at 400psi, + all the air out of the fuel lines. The Isuzu manual tells you straight that it will take a lot to start it if the oil rail isn't primed with 300cc of oil. When the diesel tries to start there's about 20A going to the glow plugs, about 15A going to the power transistors in the ECM, and about 25A going to the starter motor.

I hope you bled the fuel lines properly.. after draining the tank to check for coolant in there. If the seals were leaking it could be full of water. :-)

Did you pre-fill oil gallery before connecting injectors to it?

Did you pre-fill oil filters before installation?

What filters did you use? Genuine?

Wiring loom is connected properly?

Oil pressure gauge showing no oil pressure -which one? at the dash? or extra?

Oil level is ok?

Any MIL codes?

Check that the o-rings have not caught when you put the sleeves in and don't have fuel in the coolant etc.

Otherwise, as SergAnt says above, it takes a lot of oil to fill up again if you emptied all the system.

I was cranking my engine for quite a while. (Two battery charges from memory)

The Jack LIVES. After reading through your questions sergey, i took everything apart, gave the wiring loom another thorough clean, reinstalled everything again and hey presto oil pressure on the dash and no cel =)

**Red-one:** Have just completed the sleeve O ring replacement job, have run engine all seems fine. A few hints and observations:

There is a plug under the front end of the oil rail to empty it of oil before lifting it out. This makes it lighter as well as avoiding oil running into the chambers.

It is possible to remove the oil rail and injectors as a single unit without disconnecting the electrical leads. This removes the risk of snapping connectors, as they remain connected throughout.

Before attempting to lift the oil rail/injectors out, slacken relevant bolts and work each injector in turn until all are freed. In use, some carbon deposits around each tip, making it difficult to pull em all out together without doing this. A toothbrush is nice and soft for gentle cleaning of the tips.

I made a dynabolt puller to get the sleeves out, but instead of using a slide hammer on the end, I used a separate nut on the thread to jack the sleeves out. Used some hardwood packers to push down against the camshafts.

The lower O rings were in a worse condition than the upper ones. The lower o rings seal between the diesel and coolant. I had just started to get early symptoms of diesel in the radiator, in fact my radiator cap was difficult to remove due to swelling of the rubber seal and was replaced a couple of weeks ago.

The hesitation I was starting to get when engine running in the 2000.s 'revs. Under low load conditions now appears to have gone.

Apart from using the correct grade of oil, etc etc.. That most are now aware of - it seems to me that there are 3 key components that require regular replacement to keeping this engine running well: oil rail pressure sensor, injector wiring harness and injector sleeve O ring seals. Ignore these at your peril. If these were done together at say, 100 000 km intervals, I am sure many people would be saved from much grief.

+++++

**Fuel leak diagrams/ sleeves/o-rings:**

<http://forum.australia4wd.com/index.php?/topic/27750-what-a-fuel-leak-in-a-sleeve-looks-like/>

## 16. Sump and Engine Front -end

### High pressure Pump / Harmonic Balancer and O-rings

It turned out to be a good call. The small o-ring was totally shagged. The cost for parts was only \$40 but labour was \$840 which I thought was pretty good considering they had 2 guys on it all day to get access and compared to Holden that was going to charge approx. \$1300 labour to do the job. harmonic balancer = crankshaft pulley.

If you're having problems with the HPOP or as diagnosed on Tech II lack of pressure (min 2.8 Mpa) to enable injectors, have a search on ITOCUK, for Oil Rail Control valve, known as ORPCV or ROPCV search posts by "Gribble" for a piccy step by step. ;)

Obviously check ORPS first.

Harmonic Balancer is main pulley on crankshaft it is balanced to reduce any vibration in crankshaft. As well as drive fan etc that's my understanding anyway.

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### Sump Removal:

Posted 16 November 2009 - 11:13 AM Hi Ian, will I need to order a new sump gasket also?

What sealant is best for the sump and oil pickup if any? Thanks

#3 [Replacement oil pick up: post #3] jackezy

As we spoke about today, there is no gasket, just use some Permatex, black silicone adhesive sealant. Clean the surfaces with kero or thinners and let it evaporate before applying the sealant.

+++++

### Scrooge - Posted 20 April 2006 - 01:13 PM

On a camping trip recently to a fairly remote National Park, on starting up one morning to drive home there was no oil pressure on the gauge and the oil warning light did not go out. Thankfully on the third attempt (after running about 30 seconds each time) oil pressure came up so we were able to drive home! A similar thing happened a few days later.

I figured the most likely problem was the oil pick-up seals so I changed them. I have put some pictures in my gallery showing the parts etc. A couple of points to note:

- The cross brace behind the sump needs to be removed to enable the sump to be removed (well I'm pretty sure it needs to be, much easier anyway)

- After draining the oil the sump is still not empty, there is about .5 litre in there, so handle with care.
- You will need a 3/8" drive 12mm socket (for sump and pick-up bolts) and long extension bar. 1/2" drive ones are too bulky.
- After removing all the sump bolts and the two nuts the sump is stuck to the block by the sealant and has to be prised off with a screwdriver.
- The pick-up seals are quite a loose fit on the pick-ups and also in the holes in the engine block so it is best to put some engine silicon sealant (I used the gasket stuff, see below) under the seals so they attach to the pick-ups and round the outside before fitting to the engine. Why they are loose escapes me.
- The sump is sealed to the engine with a silicon rubber sealant. I used Silastic Black Formed in Place Gasket from Repco but anything like that will do the job.

Having done all that there was no oil pressure on start-up.

I removed the oil pressure sender to check it out (with an ohmmeter and a tyre pump) and it seemed to be working properly. On replacing it and having one last go the oil pressure gauge came up and the light went out.

I think there is a reasonable chance that there is an intermittent fault with the oil pressure sender however Holden wanted \$274 for a new one. I decided therefore to modify the sender. I got an adapter which is designed to allow fitting of an after market gauge (Speco part number 547-62) and a suitable oil pressure switch (VDO part number 231.084). I cut the black wire between the sender and the plug and soldered a wire to this and the switch terminal. There is a picture in my gallery of the assembly.

The sender now operates the oil pressure gauge and the new switch operates the oil warning light. If the light stays on and the gauge stays at nil. I know I have a problem with oil pressure. If the light goes out and the gauge stays at nil I know there is a fault with the sender. Better still nothing odd happens again!

The parts cost \$27 but it was a bit fiddly as the thread on the switch and the adapter both had to be shortened so that they sealed properly. Just for the record, the thread on the sender is 1/8" BSPT.

Thanks to Husky and Suzu for help along the way.

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**Cam sensor** My "Gates" alternator belt broke today and ripped out my cam sensor. Car won't start now but kept running when it happened.



Not available at SMS diesel spares, Repco don't have a supplier, Bursons do but the price comes in around \$150 - Genuine from Holden \$128.

No warning lights came up when sensor was destroyed but vehicle continued to run. Only one of the alternator belts broke so no alternator light came on as it continued to run on one belt. It was only when stopped that it wouldn't restart.

I am unsure when the belt broke on my journey but I do recall thinking to myself that the Jack seemed to be performing noticeably better toward the end of my trip. It was pulling much harder with the caravan on than it normally did.

### Oil Blow-by:

Turbo motors (both petrol and diesel) often suffer with blow-by, causing oil mist to be blown out the crankcase breather. Most performance shops sell oil/air separators/catch cans to strip the oil out of the air before it hits the air-filter and the rest of the intake. I made one for a previous turbo car and haven't yet fitted it to my jack. From dead cold start I am getting 20-30 seconds of thick blue smoke as the oil in the 'cooler and manifold feeds through the engine.



Something like this is what you want.... Maybe this weekend

### Oil Pickup Pipes:

I checked my oil pickup pipes on the W/E due to fluctuating pressure. The injector pickup is quite short and should not be prone to problems but the main pressure pickup is quite long (about 10 or 11 inches) and enters the oil galleries to the pump well above the oil level.

The O ring was looseish but what I believe the problem to be is the lack of support allowing the pipe to move about and then suck air through the O ring area. After fitting new O rings I fashioned a small bracket to fix both pipes together and (hopefully) making them more secure. Oil pressure is now back to normal so it looks like that was the cause of the problem.



IMG\_1978.JPG - Size: 53.87KB  
Image 2 of 3

SAVE   
CLOSE 



IMG\_1976.JPG - Size: 63.99KB  
Image 3 of 3

SAVE   
CLOSE 



IMG\_1980.JPG - Size: 90.68KB

SAVE 

**CPS - Crank Position Sensor:**

Jack would just die, no running rough / coughing / farting, nothing. Just cut out, intermittently.

I'd had a check engine light for some time with no associated code on the scan gauge, didn't seem to affect the running so ignored it....

The lack of motive power forced me to look into things a little more and after shorting the ODBC pins, I got the code for the throttle position sensor. No problems, quick call to Kumbak and the new (to me) sensor is fitted, code gone, and a quick spin down the back paddock proves it's all fixed. Not!

Thinking all was good; I headed into town to pick the kids up from school. I made it half way before she stopped again. Towed home behind the wife's Dunny door, not real embarrassing!

About another week of diagnosing the problem, ruling out all the usual suspects and I finally happened on a tip on the UK Isuzu website, which mentioned the crank position sensor. I pulled the sensor and what do you know, it was covered in mud and crap! Surely it can't be this simple....

Cleaned the sensor and reinstalled it. The workshop manual mentions an o-ring, which there was no sign of when I removed the sensor....I found one roughly the right size in the shed and fitted that.

Good find, not sure if your scan gauge will tell you, but if the CPS is dead the RPM as shown on the scanner while cranking will be half of actual.

That is it seems to be cranking at normal speed (220~240) but shows around 120RPM.

## HIGH PRESSURE OIL PUMP, OIL FLOW



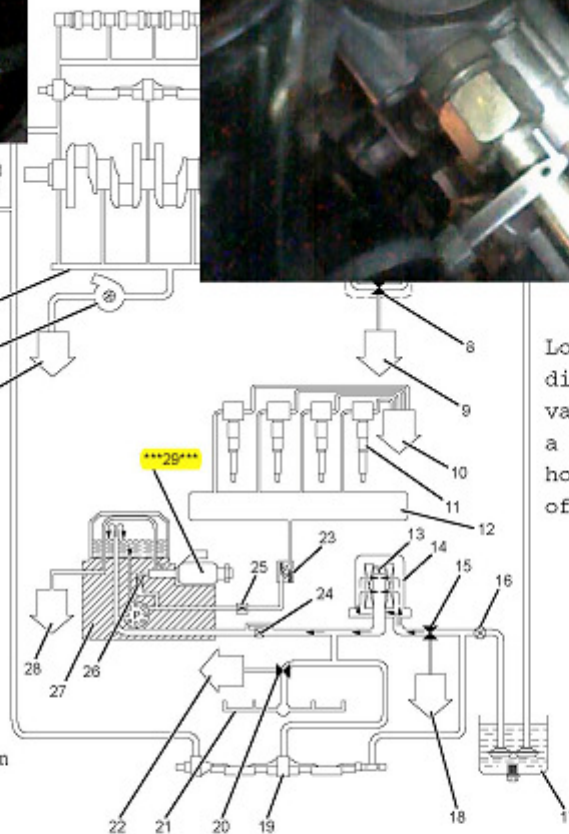
This is the pressed metal nut. Note this is designed so you can't crush the solenoid coil and damage the inner plunger clearance.

33  
32  
31  
30



Looking from the dipstick past Egr vacuum (ohh there is a bulge in that hose!!) toward front of engine

Here is the 1 1/8" or 28mm hex flange



800V010

- (17) Oil Pan
- (18) To Oil Pan
- (19) Balance Shaft
- (20) Cooling Jet Relief Valve 245 Kpa (2.5 kg/cm<sup>2</sup>/ 36 Psi)
- (21) Cooling Jet
- (22) To Oil Pan
- (23) Two Way Check Valve
- (24) Nipple Filter
- (25) Edge Filter
- (26) Edge Filter
- (27) High Pressure Oil Pump Assembly
- (28) To Oil Pan
- (29) Pressure Control Valve
- (30) To Oil Pan
- (31) Turbocharger
- (32) Oil Gallery
- (33) Timing Gear Train

## 17. TURBO:

### Cold Start Butterfly:

<http://forum.australia4wd.com/index.php?/topic/22288-no-jackaroo-problems/page-3?p=165071#entry165071>

Doesn't really matter if its at the front or on top, the 4x4 has to be moving to get airflow, so the fan would only be any good at speeds below approx. 20k's... is it worth doing ???

Yes, but there is a lot more heatsoak for top mounted intercooler's on idle.

---

### Turbo Sources:

Yes I just rang Gary Butterworth from MTQ in Melbourne (03) 9315-1633

[<http://www.mtqes.com.au/products.php>] and he confirmed the VIDS model supersedes the previous VICF with the main difference being the larger 40mm inlet wheel so more air will be pumped into the engine I would guess (Shaft size is the same). And he has these in stock so I will get this next week.

And: <http://www.dtsturbo.com.au/>

There are 3 turbos listed as having been fitted or available for fitment to the 4JX1. They are as follows:

### Man. Type Model Specs

IHI RHF5 VICF RHF5-64006P13.5NHBRL382CAZ

IHI RHF5 VIDF RHF5-64006P13.5NHBRL401CEZ

**IHI RHF5 VIDS RHF5-64006P13.5NHBRL401CEZ**

Each of the three share housings and turbines and all have an A/R of 13.5. The second and third listed differ from the originals in that they have a 40.1mm intake/inducer rather the earlier 38.2mm.

There is no information relating to shaft diameters, or improvements to oil passages.

---

Night before was spent in decisions what's better - to replace the turbo cartridge or the whole turbo? And how to pay the next month bills if so. Posted Image Or I should have to look for a new job more actively...

At my luck I decided to re-check everything once again before placing the order for a turbo. I reassemble throttle body again and made it sterile clean and used red motor-grade silicone/liquid gasket. I did a pressure test for the intercooler and air hoses. Rubber houses were inspected with magnifying glass as I still had a hope that it was not faulty turbo. Turbo shaft was checked for touching the body and horizontal play. No issues, everything OK.

And then when I started to fit the plastic duct to the turbo inlet hose I pressed it a bit stronger and got a suddenly less resistance of material than I expected. I took the duct off took off the metal clamp and started to press at the edges of this plastic. Tadamm!!! BINGO!! The pipe was cracked under the clamp! The crack was at the bottom part of fitted duct, about 40-45 mm long

The last part was easy and simple. I cut off about 10-12 mm all around, neatly fitted the clamp and tightened it saving the money for a future holidays instead of a new turbo.

The “dying kitten” Posted Image noise was eliminated with the advice from foreign 4JX1 forums: “CHECK THE VACUUM DRAIN SILENCER”

I did. Not only the silencer but the electric tap as well was clogged by dust. Some methanol for the silencer, few drops of WD40 for the tap and everything’s fine! As a bonus I’ve got a bit better breaking. Looks like the tap was leaking

Some useful tips I’ve got after this challenge

- ITPS could be replaced without disassembling everything. If you cannot find genuine one you can use from Mazda 1998-2000 with B3 engine (part # ending \*\*\*-13)
- Always keep a small magnet in the toolbox. When I unbolt the throttle 3rd time the nut falls into the intake manifold. Very stressful.
- By the time the plastic air duct loses its shape near the turbo and becomes like a funnel. I think it’s better to cut it off a bit because the expanded part prevents proper fitting and tightening
- Supporting bolt for a duct (over the thermostat) is not an option, it’s a must. It prevents the duct from sliding off the turbo and/or cracking at the bottom part due to vibration
- Application of some silicone at both sides of carton gasket rather than using just a gasket cause a big difference

Double check internet before spending money ^-)

Now the car boosts like a rocket without black smoke behind. TPS is not adjusted properly so it is too early to talk about fuel consumption



Intercooler:

Hi all. For those who are wondering about the oil in the intercooler, it is common (normal). It comes from the breather pipe on the top of the engine. This breather is connected to the air intake for the turbo. When the turbo spins, it creates a vacuum on the inlet side. This sucks oil filled air from the engine (it's designed this way, all cars do it) and through the turbo. When the air cools in the intercooler the oil condenses and stays there.

One way to stop this is to make an air/oil separator and install this between the head and air cleaner. I have made a rough one and will let you know how it goes if required. The first I installed was nowhere near big enough for the job and filled full of oil in a 4,000 km trip. The new one is much larger.

Most car sites that talk about turbo cars have a thread on oil/air separators. Saw a nice one for a Jag made from PVC pipes.

With regards to Oil Separators, I have been talking to a fella at SFS (Sydney Filter Services) who has been bringing in these you-beaut little ProVent units... See [www.mann-hummel.com](http://www.mann-hummel.com) They come from Germany and are supposed to be the ducks nuts in oil separators...

### **Turbo Mods:**

The turbo system can be modified and the following gives some advice:

<http://www.autospeed.com/cms/article.html?&A=2478>

and for some construction of a fan system:

<http://www.autospeed.com/cms/article.html?&A=110214>

and:

<http://www.autospeed.com/cms/article.html?&A=110215>

### **Airbox to turbo pipe**

Was adjusting my steering box preload today to eliminate some free-play and in the process removed the airbox to turbo pipe to allow better access, when I discovered that it had not been installed correctly by the last person to have it off. The underside of the flexible end that attaches to the turbo was folded under the clamp, which not only allowed intake oil contamination to leak out but also most disturbingly allows air/dirt etc to be drawn straight into the compressor.

If you haven't had yours off it would be worth checking, as replacing a turbo is something all of us want to avoid.

I don't know whether it is directly related, but I also checked the turbo-bearing free play and it is well beyond the allowable max of 0.14mm. Looks like I have another warranty claim to make.

Cheers Andy

**Turbo Timers:**

Holden Jackaroo L2 Series Turbo & Rodeo R7/R9 Turbo - Including 3.0 Litre

(Product Code: 724 R7)

The most popular and foolproof method of guaranteeing that the engine manufacturer's recommendation is carried out every time you switch off is to fit a BOGAARD Turbo Timer.

Many thousands are fitted to vehicles as diverse as Subarus, Land Cruisers and Kenworth trucks. Some of Australia's largest and most respected truck manufacturers fit BOGAARD Turbo Timers on their assembly lines.

BOGAARD Turbo Timers are inexpensive, foolproof & fail-safe. They are easy to fit, with plug-in models for many popular passenger & off-road vehicles.

\$271.04(inc GST)

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**Turbo Changes [Type suitable]:**

Yes I just rang Gary Butterworth from MTQ in Melbourne (03) 9315-1633 and he confirmed the VIDS model supersedes the previous VICF with the main difference being the larger 40mm inlet wheel so more air will be pumped into the engine I would guess (Shaft size is the same). And he has these in stock so I will get this next week.

**OTHERS: Hi Arno**

**I dont know what caused your turbo to sieze up, but I do know there supposed to be free, anyway you can get a turbo cartridge from E-bay for about \$220 delivered in 4 days TNT, the one I bought was identical to the one I took off,and they are a piece of cake to change.**

**Little tip just buy the cartridge and not the full turbo housing. Below is where I bought mine from and I thought that was reasonable good luck ..... Devon**

**[www.ebay.com.au](http://www.ebay.com.au) and search for RHF5 Turbo Cartridge Chra Jackaroo Trooper 4JX1T**

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**TURBO Removal and replacement:**

Matt H, on 30 May 2009, 08:03 PM, said:

6. Remove the air intake pipe, which connects the air filter chamber to the turbo inlet.
7. Remove the intercooler.
11. Remove the two brackets, which support the intercooler forward and aft of the turbo.
12. Remove the four bolts, which hold the heat shield around the turbo. There is one down the back, which is a bit of struggle.



13. Remove the heat shield.

14. Very carefully remove the oil feed pipe connected to the top of the turbo manifold. Make sure you don't leave behind the copper washer underneath.

15. Leave the oil feed pipe positioned over its original spot. You will need to move it slightly to access the two bolts connecting the turbo to the exhaust manifold.

16. With a small socket driver set. e.g. 3/8" rather than 1/2" remove the water pipe connected to the underside of the turbo. With a combination of spanners, remove the two water pipes from the engine side of the turbo.

17. Remove the rubber houses connecting this pipe to the side of the engine. (the oil drain pipe)

18. Clear access to the three 12mm nuts securing the turbo to the manifold should now be visible. Be very careful attempting to loosen these. The heat will have them stuck hard.

20. Using a 14mm socket and about 3 or 4 extension, get under the car, in the same direction the oil filter was removed from, and attempt to remove the two nuts which connect the flexible exhaust line from the cast iron exhaust manifold directly under the turbo. I had to use an extra long handle to get mine to budge. Undo the 4 12mm nuts that secure the dump pipe to the turbo.

19. If you haven't removed any skin so far your doing well.

22. Up to this stage took me 2.5 hours.

When I removed mine just recently these were the only steps I took. Leaving the AC in place probably only cost me 10 minutes or so in extra time to get at the 3 manifold - turbo nuts.

Matt H, on 30 May 2009, 08:03 PM, said:

25. Remove the four-m12 nuts, which secure the long exhaust section to the main body of the turbo. These are very tight due to the effects of heat.

You need to remove these studs, as the new turbo does not come with them. Turbo Aust advise that if you break one, do yourself a favour and just go to Holden and get some for the new turbo, as it is far easier than trying to find the right parts elsewhere and for one they aren't that dear.

Matt H, on 30 May 2009, 08:03 PM, said:

35. Using a 10mm socket at the exhaust end, and an 8mm socket and the intake end, remove the nut, which secures the compressor fan to the shaft. Its left handed, or the opposite to what you would expect. The odds of stuffing the thread are extremely high.

36. Once the nut is off, you can remove the compressor fan. Four more star head bolts secure the opposite half of the aluminium intake housing to the bearing housing section. A gentle tap with a screwdriver will remove this aluminium section.

The compressor to shaft alignment should be noted (scribe mark etc) before removal if you plan on putting it back together. The assembly is precision balanced and should be re-assembled in exactly the same position.

Matt H, on 30 May 2009, 08:03 PM, said:

42. Conclusion, well I had finally satisfied my self that the turbo can not be reconditioned by an amateur. The journal bearings are pressed into place, and would need to be damaged in order to remove.

Hmm.. Mine came out as part of disassembly. No pressing was required. Perhaps that is part of the problem with yours if they have fused into the body.

Matt H, on 30 May 2009, 08:03 PM, said:

43. Come Monday I am ringing Turbo Australia for a replacement. Not sure how much of the turbo they give you. Will update shortly. I hope this was of some benefit. Cheers, Matt

They give you a complete turbocharger with a new oil outlet gasket. They suggested to me that if I was careful with removal I could re-use all other gaskets and copper washers (which I did) but apply a smear of high temp 'Ultra Copper' to the exhaust gaskets upon assembly. If I did mine again I would probably anneal the copper washers before reassembly.

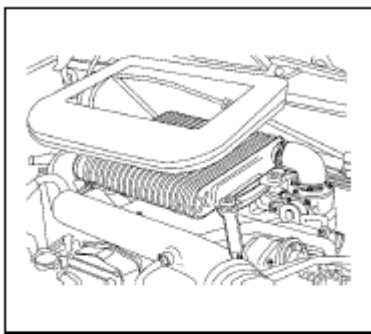
The other thing they do not come with is the dump pipe studs as I mentioned above.

+++++

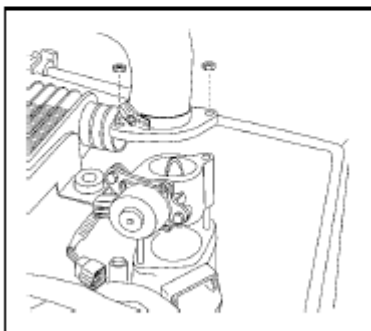
## 18. TPS [Throttle Position Sensor]

4JX1-TC ENGINE DRIVEABILITY AND EMISSIONS 6E-209

2. Remove the cover of the intercooler.



3. Remove the bolts and the left side bracket to the intercooler.
4. Remove the air duct with bracket from the intercooler.
5. Remove the throttle body from the intake manifold.
6. Disconnect the ITP sensor electrical connector and throttle motor control connector.
7. Remove the bolts and the ITP sensor from the throttle body.



NOTE: Do not clean the ITP sensor by soaking it in solvent. The sensor will be damaged as a result.

### Function Check

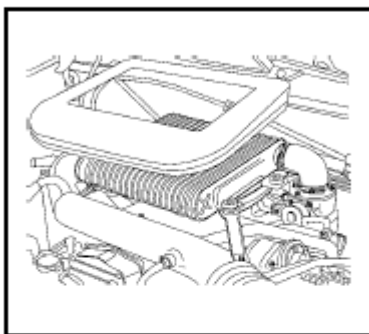
Use a Tech 2 to check the ITP sensor output voltage at closed throttle.

- The voltage should be under 0.85 volt.
- If the reading is greater than 0.85 volt, check the throttle shaft to see if it is binding.

- If the throttle shaft is not binding and the throttle cable is properly adjusted, install a new ITP sensor.

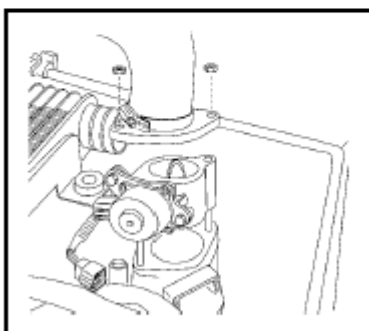
### Installation Procedure

1. Install the ITP sensor on the throttle body with the bolts.



2. Install the throttle body to the intake manifold and the air duct with bracket between throttle body and intercooler.

Torques: 20 N·m (14 lb ft)



3. Connect the ITP sensor electrical connector and throttle motor control connector.
4. Install the bracket to the intercooler.
5. Install the cover of intercooler.
6. Install the negative battery cable.

DTC #74 is our old pal, the TPS - which, again, might NOT be faulty. Whether with a new TPS or an old one, the output-voltage seen by the ECM [measured at J1-18] varies with the MOUNTING-ANGLE of the TPS on the side of the Throttle-Body. So, loosen the 2 mounting-bolts, set up the Voltmeter [between the ECM-connector-J1, pin J1-18 and Battery (-)] and turn the TPS until the voltage is about 0.85V - that's with the Ignition ON and the Engine OFF. It does NOT require a Tech2, as the voltage can be read directly from the ECM connectors.

## ITP [Intake Throttle Position] sensor – Error DTC 74

I think what Browndoff means to say is use a Tech 2!

Then using the Throttle Position Motor program, check the TPS voltages at each step against the chart below.

The TPS might be OK, but just way out of alignment or in need of a clean with some contact cleaner.

I removed the TPS and cleaned it with contact cleaner. This made no difference whatsoever. I purchased a new TPS (Holden part number 8973728510) which cost \$108. Fitting this seems to have cured the problem (I haven't driven far yet but the check engine light has not come on).



I disassembled the old TPS which is basically a carbon film potentiometer (variable resistor). The carbon film was badly worn (see picture) by the sweeper and presumably the film was completely worn through in places giving the occasional open circuit which would cause the check engine light to come on. There was no oil inside the TPS.

Two points which may be helpful to others:

1/ There is no need to take off the throttle assembly to replace the TPS if you have the right tools. The top bolt can be removed and replaced easily with a 5/16 AF ring or open-ended spanner. The bottom bolt can be removed and replaced reasonably easily with a 1/4" drive 5/16 AF socket with ratchet driver. I did need to remove the air pipe between the intercooler and throttle to allow access.

2/ There seems to be no need for adjustment using the Tech 2, no mention of the need for adjustment is made in the workshop manual. It would be great if this could be confirmed by someone who knows!!

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## Throttle Body and EGR:

How can the throttle get dirty from oil AND EGR if the EGR is AFTER the throttle plate??

We have had the discussion about disabling the EGR before and the conclusion is the ECM in the 4JX1 uses the throttle and EGR to increase efficiency not the other way round like most people wrongly believe!

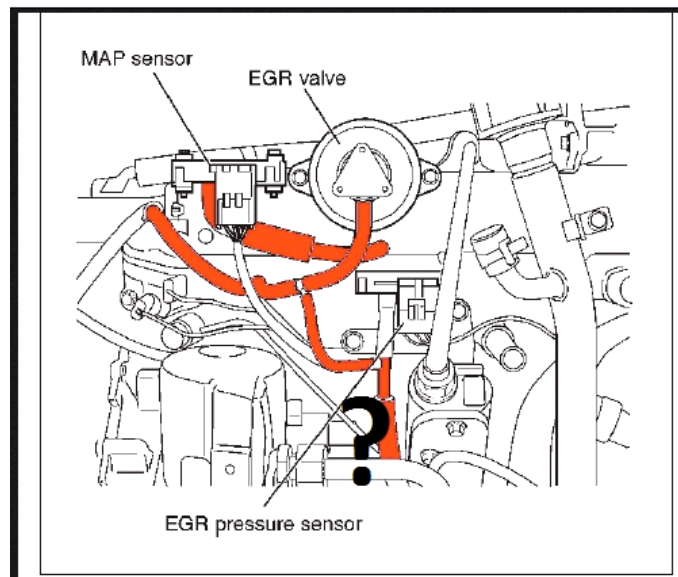
The EGR also is used to reduce the combustion temp by about 500 degrees by reducing the amount of oxygen in the air as you said which is a good reason not to disable it. This extra 500° could also cause the injector sleeve seals and injector gaskets (copper washer under the injector) to fail prematurely thus causing more trouble than good.

Also, if you disable the EGR we won't ALL live happily ever after. You won't be happy after receiving a fine or yellow sticker for disabling the emissions reduction system and the tree huggers won't be happy either!

**Easy solution** to keeping the intake throttle clean is to use a **catch can** on the breather hose.

No more oil into the intake = clean throttle plate and cleaner intake manifold.

If you use a EGR filter\soot catch can thingo (they do actually exist!) you will then reduce the soot in the intake and the intake manifold will be nice and clean. No oil or soot. Problem solved!



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I might be wrong but there is a thread in Isuzu DYI about someone who fitted an EGR valve out of a VT commodore, bought it for \$77.00 and it fitted in and works fine. Regards Ian

=====

Posted 26 October 2009 - 01:55 AM

Hi Guys, just an update. Removed the EGR valve completely as the diaphragm had a hole and was leaking exhaust gas and boost into the engine bay. Removed and cleaned the MAP sensor but it was pretty clean inside. Bit of fiddling to refit the actual valve to seal the hole between the exhaust and intake manifolds but did it in the end, and an instant increase in power and torque! Don't think I'll bother replacing it as I've read that the EGV valve only reduces some of the nasty exhaust emissions. Not very green of me I know!!

**EGR Removal and Service:**

Posted 26 February 2011 - 07:38 AM

I am in the process of doing up a Jackaroo 3.0TD 1998 as per normal there is build up of soot and oil in the intake manifold. The back inlet port on my manifold was sooted up that bad, the hole was down to a size of a pen, and the Jackaroo only done 134,000 kms

I have been doing allot of research and this is the best solution to the problem.

Take off the EGR valve, wipe the seat clean and use 401 silicone on the seat and valve, just to give a real good seal and put it back on

Block up the vacuum line going to the EGR, say with silicone and a ball bearing, and push it back on, so it looks still intact

If your Jackaroo has done a few km's would pay to remove intake manifold and give a real good clean out, (took me over an hour just to clean the intake manifold out, pressure wash best)

Make sure the area around MAP sensor is clean

Buy an "oil catch can" off eBay (us eBay best price), about .75 litre size is large enough, mount in a suitable location, on the firewall, route pipe from the PCV to the catch can. Then route a pipe back to the original position on the intake between the air filter and the turbo, use original looking rubber pipe to keep the engine bay looking tidy. Job done.

Every time you change the engine oil, also drain the catch can, all the good catch cans come with sight glass and drain bungs.

EGR valve not opening will give more clean air (and oxygen), to give a better combustion etc.

(Cat, Toyota and a few other makers have stopped using the EGR system now, been having way too many problems)

Benefits are:

- More power
- Better fuel economy
- MAP sensor will work better
- Intake manifold will stay clean and intake ports will not get smaller in size.

"But don't tell too many people what you done, just keeping amongst us 4JX1 nuts"

+++++

Posted 13 August 2013 - 01:36 AM You can disable the EGR by unplugging the hose at the bottom of the valve.

Follow that hose back to the T piece, unplug all of the hoses and then push the two remaining hoses together (one is smaller than the other). You should be left with a short length of hose and a 'T' piece.

It doesn't completely stop the EGR, but it does make a difference. It increased my cold engine performance significantly. No more gutless slow diesel until it warms up. (Thanks to Pete88 on Club Isuzu)

+++++

Posted 21 July 2011 - 11:06 PM Just reading this with interest. I blocked off my EGR some time back after reading this on an another forum.

Since blocking the valve my motor seems to be running the same except now the motor oil is much cleaner! Also some time later I removed the intake pipework and checked it out, the inner air passage was almost blocked with black sticky carbon gunk - took forever to get off!

Blocking the EGR will extend your motors life by removing the carbon soot from the intake, this rubbish acts like sand paper and will destroy your motor!! Some people commented that Toyota actually recommend blocking this pipe off!

To block the EGR off remove the pipe from the exhaust manifold, remove the gasket, make a new gasket out of tin but don't cut out a hole to stop the exhaust from flowing through, reinstall the pipe work - all done without any sign of a modification.

As for it providing some form of pollution control, this also is a load of crock - by recirculating some of the exhaust gasses it dilutes the gas heading out the rear fooling the equipment into thinking it's cleaner.

Posted 13 August 2013 - 08:57 AM

Our 4jx1 engine was designed with EGR system built-in. If its faulty or blocked The temperature balance

changes, especially at cylinder #4. As a result We have burned holes in the piston and engine replacement. So, please, be careful while playing with EGR. Yes, in short-term it doesn't matter, but for a long time it could have an expensive result Sergey

DIAGNOSIS HINT	
MAP Sensor Blocked With Carbon	
UBS - 4JX1	
Group 6C	Ref. No. TL1046 - 0511

#### CONDITION

Vehicles with a blocked MAP sensor may exhibit one or more of the following conditions:

- Flat spot
- Blowing Black Smoke
- Tech 2 shows insufficient manifold boost pressure.
- MAP sensor is slow to respond when viewed through Tech 2.

The above conditions can vary with change in vehicle operating temperature.

Due to easy accessibility, inspecting the MAP sensor for blockage may be easier than diagnosing through Tech 2. Typical blockage is shown in Figure 1.

**Note 1:** Inspecting for MAP sensor for blockage does not confirm that the MAP sensor or sensor circuit are OK. This should be considered if further diagnostics are required.

**Note 2:** MAP sensor blockage can result in driveability symptoms that could be easily mistaken for a sticking rail pressure control valve (RPCV) or sticking throttle valve.



Figure 1. MAP sensor blocked with carbon (Euro III Sensor Shown)

#### CORRECTION

Clean the built up carbon from the MAP sensor breather hole. Gently scrape the carbon build up from the breather hole while holding the sensor in a position that allows the carbon to fall out of the sensor. **Avoid pushing carbon into the sensor.** (Refer Figure 2)

**Note:** Do not use flammable cleaners on the sensor or in the manifold.



Figure 2. MAP Sensor After Cleaning



Posted 31 August 2013 - 06:59 PM Jack, on 31 Aug 2013 - 12:14 PM, said:

There are many other types of Diesels with EGRs that have the EGR system blanked off with no apparent ill effects. Some have to have a small hole in the blanking plate to prevent a fault code and subsequent limp mode, but that's it.

Yes it's tempting to just block the EGR thing off and have a clean intake manifold. But it seems that Isuzu fitted a throttle plate mainly for the EGR, which means that throttle plate openings are timed to suit the EGR manifold vacuum requirement, so the system is well embedded in the ECM's programming.

I would say that Isuzu used the (legislated) compulsory EGR requirement, and the accompanying throttle plate gizmo, to control a few other things as well. Such as the mass of air coming into the cylinders (air/fuel ratio) and turbo spool down times (and thus engine braking ). This seems to effect idle running and god knows what else.

It would be rather handy if the Isuzu manual started every chapter with "and we did this because... "

+++++

## Calibrating the TPS [Throttle Position Sensor]

<http://forum.australia4wd.com/index.php?/topic/28024-tps-adjustment-procedure/?p=196608>  
for full description and comprehensive images.

I've had the throttle body off a few times for various reasons and I thought I'd share with you my procedure for calibrating the TPS. As SergAnt and other gurus will tell you it's important that the TPS is calibrated correctly otherwise engine power and fuel consumption can be adversely affected.

Use of Tech2. With this baby you can run a throttle position sensor test where you can step through all the throttle positions from 0 through to 10 and display the TPS voltage.

### TPS:

A complete instruction and images: <http://forum.australia4wd.com/index.php?/topic/22826-technical-article-tps-replacement/>

*The adjustment procedure that I recommend is as follows:*

1. Remove intercooler cover.
2. Loosen the clamps on the pressure hose between the intercooler and the throttle body.
3. Remove the intercooler mounting bolts. No need to remove all four, just the two on the throttle body side will suffice.
4. Remove the pressure hose between the intercooler and the throttle body.
5. Remove the intercooler bracket that is attached to the throttle body.

6. Remove throttle body assembly, take off stepper motor and TPS. Make sure that you don't lose the small section O-ring that seals the TPS to the throttle body.
7. Clean the throttle body with good quality carby cleaner. It's important that you take the stepper motor and TPS off before you use the carby cleaner as it's an aggressive cleaning agent and could easily damage them.

Attached File Throttle body components.jpg 90.76KB 1 downloads

8. After cleaning, and before reinstalling the stepper motor and TPS, ensure that the throttle blade moves freely throughout its entire travel without binding and that the return spring moves the blade back to wide open without hesitation.

Attached File Maximum blade angle adjustment screw.jpg 83.79KB 1 downloads

9. Clean the O-rings that seal the stepper motor and TPS with a clean lint free rag then mount the stepper motor and TPS back on the throttle body. Nip the mounting screws up just a bit but leave them loose enough so that you can rotate the stepper motor and TPS against the throttle body.
10. Loosen the jam nut on the small allen head screw which determines the maximum blade angle and loosen the screw. This needs to be loosened to ensure that the stepper can move the throttle blade to its maximum extent.

Attached File Throttle body components.jpg 90.76KB 1 downloads

11. While I've found that you can adjust the TPS with the throttle body installed on the manifold, it's much easier to adjust everything with the throttle body connected but just sitting on the manifold as shown in this image

Attached File Testing before reinstalling.jpg 75.55KB 3 downloads

12. Disconnect the glow plug wiring harness as shown. This will reduce battery drain while you adjust the stepper motor and TPS positions.

Attached File Disconnect glow plugs.jpg 60.03KB 3 downloads

13. Turn on the ignition without engaging the starter, power up the Tech2, go to the Miscellaneous Test menu and select Throttle Position Motor.

14. Scroll down the data display until you see TPS voltage above the Throttle Position at the bottom of the display.

15. Use the 'Decrease' soft key to get the stepper motor to zero steps if it isn't already there then rotate the TPS until the TPS voltage is as close to 0.50V as you can get. The allowable voltage range is 0.44V to 0.56V.

Attached File Tech2 showing motor steps & TPS voltage.jpg 78.24KB 2 downloads

16. Tighten the TPS mounting screws and ensure that the TPS voltage has not changed.

17. Use the 'Increase' soft key to advance the stepper motor to 1 step, then rotate the stepper motor until the TPS voltage is as close to 0.84V as you can get. The allowable voltage range is 0.75V to 0.95V.

18. Go through all the stepper motor positions and record the TPS voltage for each step. The allowable voltage values are in the table below.

Attached File TPS values.png 26.03KB 1 downloads

19. Repeat step 18 a number of times to see if the TPS voltage remains the same each time. Note that the allowable voltage variation is by +/- 0.02V between runs.

20. With the stepper motor at step 1, tighten the stepper motor mounting screws and ensure that the TPS voltage doesn't change.

21. Select zero steps, unscrew the allen head screw then push the throttle blade until it contacts the throttle body. Next, screw in the allen head screw until the throttle blade starts to move away from the throttle body. Note the voltage on the Tech2 - it should be higher than was achieved at step 10. When shutting down the engine, the ECU commands the stepper motor to step 11, which I presume is to fully close the air intake to gently stop the engine.

22. Retighten the jam nut and recheck that the TPS voltage at 10 steps has not changed.

23. Power off the Tech2 and turn off the ignition.

24. Disconnect the stepper motor and TPS wiring and reinstall the throttle body using new gaskets.

25. Reconnect the stepper motor and TPS wiring. Retighten the stepper motor and TPS mounting screws.

26. Reinstall the intercooler bracket that bolts to the throttle body.

27. Reinstall the pressure hose between the intercooler and the throttle body.

28. Tighten the intercooler mounting bolts.

29. Tighten the clamps on the pressure hose between the intercooler and the throttle body.

30. Replace intercooler cover.

31. Reconnect the glow plug wiring.

32. Start the engine and re-run the Throttle Position Motor test on the Tech2 as a final confirmation.

### ECU and calibration of TPS:

When I replaced my first TPS I checked it out with a multimeter and found that it gave correct values at either end of its travel but gave inconsistent readings in the middle of its travel. From what I have observed while freeway driving around with Tech2 attached is that the stepper motor spends a lot of its time in the middle sectors, around 4~7 steps which is exactly where it was giving inconsistent readings. So to recap.

1. It may be possible to use a multimeter to diagnose a faulty TPS
2. It is possible for a known good TPS to be calibrated to produce the correct voltage at zero steps by using a simple multimeter.

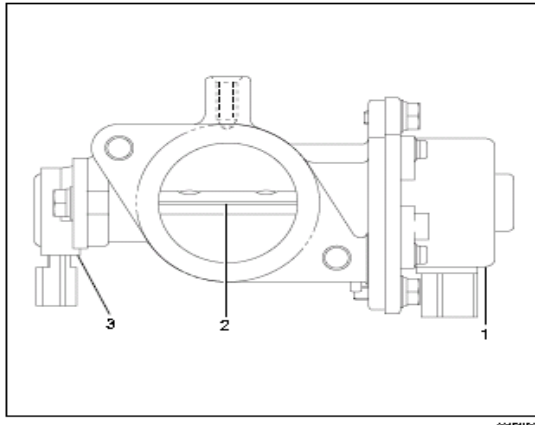
3. It is not possible to calibrate the stepper motor without being able to get it to move from zero steps to a known step, whether that step be 1, 2, or any number up to 10.
  4. If the stepper motor is not calibrated then the ECU will not be able to position the throttle blade accurately even though the TPS is correctly calibrated.
- 

## INDUCTION 6J – 9

## INTAKE THROTTLE VALVE

### REMOVAL

1. Remove intercooler assembly.  
Refer to "Intercooler" in this manual.
2. Remove harness connector from motor and ITP sensor.
3. Loosen the two fixing nuts and remove the throttle valve assembly.

**Legend**

- (1) Motor
- (2) Intake Throttle Valve
- (3) ITP sensor

### INSPECTION AND REPAIR

1. Check for catching somewhere on the throttle valve.
2. If some problem is discovered during inspection on the throttle valve, the throttle valve must replace.

### INSTALLATION

1. Put gasket on the intake manifold and install throttle valve.
2. Tighten nuts to the specified torque.

**Torque: 20 N·m (2.0 kg·m / 14.5 lb ft)**

3. Reconnect harness connector to motor and ITP sensor.
4. Install intercooler assembly.

## Rail Pressure Control Valve [RPCV] or Pressure control valve [PCV]

by DieMonty

Recommend retail price \$680. (Obviously dealer dependant) Part # G\*8971748720

The rail pressure control valve is in the high-pressure oil circuit. It is an important device, which is used to control oil pressure in the HEUI system. High oil pressure = high voltage and Low oil pressure = low voltage

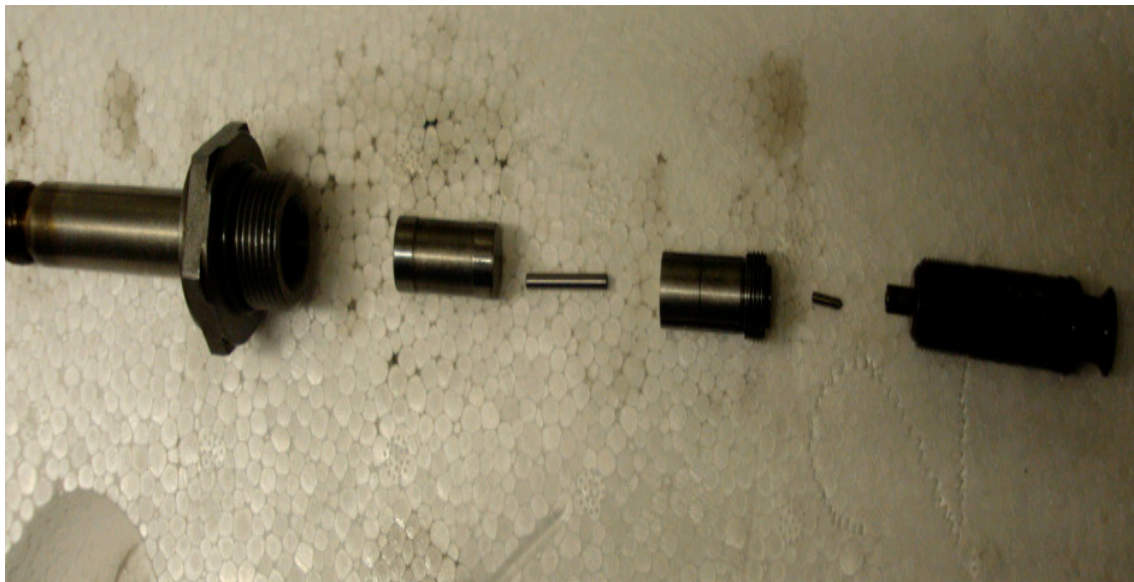
The reason the engine won't start is because the ECU sets the ORPCV at a position that returns the wanted 1 volt but because the ORPS is giving a "false high" the pressure is actually too low for the injectors to work correctly.

The workshop manual also establishes this information. i.e. the relation ship between pressure / volts

**Symptoms:** If faulty (these occurred to me and replacing the valve fixed all of them MAY 2009)

1. Shuddering or missing like petrol engine;
2. Below average horse power and performance and a slight rise in fuel consumption
3. Delayed auto change down and laboring in all gears

Generally a good strip and clean of the mechanical parts would suffice, but my valve had substantial corrosion, which prevented smooth operation. Speaking to the mechanic who found and cleaned mine said a lot of the problems associated from dirty oil.



Being either from **not changing the small oil filter regularly enough this will cause a blocked filter and the bypass valve will open** allowing unfiltered oil into the fuel pump side circuit or letting the oil degrade leaving residual deposits of crud.

In my case the previous owner doing too many short trips to get the paper and not getting engine oil to operating temperature to evaporate condensation.

Preventative maintenance would suggest frequent oil and filter changes (including small one), a few extra dollars every 5000klms will save break downs due to bad oil condition.

+++++

RPCV on the back of the HP pump,

+++++

### **To replace or disassemble the control valve DIY.**

1/ Check if you have a selection of 1 1/8 open spanners or tube socket.(a normal socket won't fit around the flange)

2/ good idea to check if dirt or sand is in the area because you are going to expose the high-pressure oil pump to contaminants and get a good light [this fella is in a bad spot];

4/ remove passenger front wheel or jack up so it drops away. (RH drive vehicle) and remove small rubber skirt to gain access to engine bay from wheel arch

6/ identify valve and disconnect electrical connection it has small clip just for added fun

7/ remove pressed metal nut, sleeve and coil using 1 1/8 spanner or tube socket unscrew valve from pump

9/ the valve does come apart by unscrewing the front part where the oil holes are (mine had vice grip marks on it).

10/ inspect condition and clean then carefully reassemble and do not to over tighten pressed metal nut

The ROPCV can be changed without going through the wheel arch. Disconnect the batteries. Remove the fuel filter mount, and put this aside, with fuel lines still intact. Unplug and remove the ECU, putting it somewhere safe.

**TOOL:** A Stanley 1 1/8 th inch ring spanner from Supercheap costs \$26, and if you cut the one third end off near the open ender, with a metal drop saw, you can easily access the ROPCV.

There is even no need to disconnect the fuel line in front of the ROPCV. I did mine without the ECM being removed, twice now. From the top, and even left the fuel line to the cylinder head sitting on the lower banjo bolt still, although it was loose and removed from the top.

## 19. Fuel supply – Tank and initial Fuel Filter:

This problem started [Woodsy] when I did the 120000km service and one of the jobs was to replace the fuel filter.

I noticed a little later (a couple of 100 ks) that the motor would start OK and a couple of seconds later run rough and then stall. To restart I would have to crank it over for about 20 seconds and it would splutter into life. After this happened again I checked around under the bonnet and found I could pump the primer on top of the fuel filter several times. I opened the bled vent and pumped the air out thinking that would be the end of the problem - NO WAY.

It has continued to happen after about 100/200 kms.

I replaced the full filter housing containing the priming pump and no more problems!!!

Obviously the diaphragm in the pump had a small hole or tear allowing air to be drawn in.

I had pressure tested the housing before and found no leaks but the pressure must have closed the hole/tear.

---

### Replace Fuel Filter –

Posted 05 May 2005 - 10:13 PM

I did mine last week after Sal had a starting problem one night, just to be safe. to get going she hit the priming pump a couple of times and the Jack started??? Dunno what was wrong.

Ok assuming you have removed and replaced the filter, this can be a challenge.

Get a 10mm spanner and loosen (about a turn) the bolt on the pump body, at about 9 O'clock standing at front of vehicle. Press the pump down lots of times until smooth flow of fuel, no bubbles. tighten bolt. Done.

If you are having trouble removing the filter, I did. I resorted to removing the pump body, only 2 bolts and 2 hose clamps and attacking the filter with a screwdriver. What eventually got it free was using a screwdriver to break the seal of the O-ring on the filter.

### Basic steps start to finish:

1. Remove shield bracket thing, 2 bolts
  2. Remove fuel hoses (hose clamps)
  3. Remove pump assembly (2 bolts) may not be necessary if you can get the old filter off.
  4. Attack old filter to get it off
-



5. Install new filter and reassemble
6. Prime filter by manual pumping.

**To bleed fuel system:**

- Loosen bleed screw on filter housing
- Pump until fuel comes out continue pumping until no air bubbles.
- After bleeding, secure bleed screw.
- Operate primer several more times and you're done

I have attached a couple of photos of my original diesel filter housing, (Filter type Z321 ) If you look at the left hand filter outlet pipe, you can see a small circular shape with a notch either side in the housing body, this is a small kind of brass gauze filter that is easily over looked when changing the fuel filter, from what I have been told, this bypass gorse filter is to stop air locks in the filter.

Since cleaning mine out, the engine purrs like a kitten at idling ..... Devon



007.JPG - Size: 162.15KB  
Image 1 of 2

SAVE



005.JPG - Size: 163.49KB  
Image 2 of 2

SAVE

## PCV:

Since it fires with the white-wire cut - but runs at only 300RPM with no throttle-response - then it's clear that the cut wire is fooling the ECM into thinking that there's enough Pressure -so it fires - but very weakly!

THAT means the pressure is REALLY too low for normal running - so the problem lies with the Rail-Oil-Pressure-Control-Valve.

They're awkward to reach - but it DOES NOT require you to access it via the wheel-arch - just move the Fuel-Filter and the ECM temporarily.

In cleaning the ROPCV, be careful to ensure that the 4 tiny holes in the little cylindrical needle valve are clear

ROPCV Stripped -1.png and that you re-assemble with the needle's sharp end pointing INTO the cylinder.

When clean, it SHOULD allow the HP oil into the Rail and it should start properly.

If you DO have to replace the ROPCV - then try <http://www.isuzuauto...m/Pages/gp.html>

The Large-Dampening-Hole faces the 'blind' end of the Valve-Body [where the sheet-metal Nut attaches], then the Long-Pin sits on the other end of the Solenoid-Moved Piston - with the Long-Pin inside the Pin-Housing, itself screwed into the Valve-Body until just 'tight' - don't get too 'enthusiastic'!

Slip the Needle into the Needle-Valve [blunt-end facing the Long-Pin] and screw the Main-valve into the Valve-Body [try NOT to scratch the outside!].

After you've screwed the whole thing into the HP-Oil-Pump, oil the inside of the Solenoid casing and slip it over the end, then the Top-Hat and the Nut - be SURE to tighten the Nut as much as you think it will take - if it gets loose it can fall OFF and the ROPCV will stop working properly ['cos the Solenoid has no 'leverage'].

The reason the small hole must face out, is that the piston must PUSH on the end of the Long-Pin - if it were the other way around, the Pin might fall inside the Piston.

## 20. Other Solutions – Other sources:

<http://forum.australia4wd.com/index.php?/topic/27713-a-run-down-of-things-that-have-fixed-issues-with-my-4jx1/>

Shop there had replaced second hand H.P. pump, New injectors and new glow plugs. Still failed to get it to run. My guys got it running. It was driven to us and I rode it around for about seven days to make sure everything was ok.. Parked it on a slope one day and it began to misfire on start up. Idled but would not pick up RPM. Bled the system, and it started up behaved as it should. The next few days it became progressively worse....Went to start it two days later....Zero....just cranks....We've tried to clean the ORPS with WD-40 still nothing...

Try fitting a separate transfer pump between the tank and HP pump (quick/cheap fix only) and see if this resolves the problem. If yes check filler cap (no air lock), air leaks in supply hoses or transfer pump (and of course the usual "check the fuel filter").

If not, dig deeper.

**Isuzu Trooper 3.0D DOHC 4JX1 WON'T START AFTER REPLACING FLYWHEEL**

Three weeks ago I replaced the faulty dual mass flywheel with a second hand but working one + Diesel and oil filters for engine and Turbo. From then on the 4JX1 engine refused to start. An expert mech. checked the flywheel sensor and declared it fit, still he could not start it. It cranks and produces all the signs of attempting to start but fail to. Did I overlook something? Can you please help out?

Open one of the injector lines till fuel pumps out

**My Isuzu Trooper 2004 4JX1 turbo just underwent a general engine overhaul.**

Its cranking but will not start. All electrical's are ok. Does the PCM needed to be reset for it to start?

Check the alignment of the camshafts. Make sure the marks were aligned correctly.

**isuzu trooper 4jx1 my isuzu 4jx1 don't start.**

Is it an electric problem, looks like no current on injection pump. Where to check? Where is the connection or valve are located?

You have no injection pump, each injector does that job. You have a faulty rail oil pressure sensor [ORPS] I think, read my tips to test this sensor.

**Isuzu 4JX1 Engine Won't Start after replacing new injector**

Can anyone suggest, assist, help me with these? My newly replaced injector did not received any fuel as I start (crank the engine)

You probably need to enter the new injector numbers into the ECU using a Tech2 Tester by your nearest dealer.

**1999 trooper 4JX1 fuel black**

My trooper would fire then die in mornings but would eventually start. Start ok when hot. Removed fuel filter and it was full of black fuel! New filter fitted and started fine but what can be causing this. The recall work on injectors has been done. Thanks

**Engine oil leaking past injector O rings** and going into fuel return hose back to tank contaminates tank. If recall done are O rings ok? Can put clear plastic tube on return fitting in rear of head to see if black (contaminated with oil) or air leaks, from cold start, it isn't high pressure it could be from before or now?

My 1st experienced with my 4jx1 engine was, **diesel fuel mixing with water inside my radiator** so I replaced set of O ring at nozzle, 2nd is after a month I cant start my engine until I replace RPCV sensor and oil pressure sensor and it works and now I came to find out that my oil dip stick is getting high in normal level and smells in diesel,, how could you help me? Right now I'm still using my trooper. Is it safe to use?

You need to replacing Injector 'O; rings properly.

My Isuzu Bighorn 4JX1 RJM Engine stalled after fitting it with **new oil pump**.

It can crank but it emits smoke but not run. What could be the problem? I have tried to check if the fuel pump is not working but the test showed that it is working well.

The engine oil pumps are in the rear of the engine (trans out) and behind flexplate /flywheel, were any of these 2 engine oil pumps touched if so the flywheel /flexplate has to be timed to crankshaft position. So you might have it in the wrong position, if your talking about the diesel lift pump (injector pump) that also supplies high pressure engine oil to injectors, after replacing this there is a learn procedure for the rail pressure control valve that is on pump. Dealer or some one with Tech2 scanner tool can only do this.

**Don't start after oil change** I have a 4jx1 trooper. It cut off after oil change.

I open the engine and change rings. Everything is new but the injectors. The mechanic put some 15-40 oil in it. It doesn't start. What else can I do if I can't get the Tech2?

I HAVE A TROOPER 3.0 L THE SAME AS YOU AND I KNOW THAT WHEN CHANGING OIL YOU MUST USE 5-30 OR 5-40 FOR THIS ENGINE REASON BEING IS THAT THE OTHER GRADE DOESNT CREATE THE SAME OIL PRESSURE AND IF THE OIL PRESSURE IS NOT CORRECT THESE ENGINES WILL NOT RUN BEEN THERE DONE THAT

I have a Isuzu Bighorn 4jx1 but is **hard starting**. When it cranks the engine on but but does not pick up speed or it starts like it was out of fuel. Can you advice on what to do?

Try slightly over filling oil level if engine starts and runs for a minute or two then dies the oil pick up in sump has fallen out (cracked mounting bracket) or sucking air instead of oil. you can remove small tin engine sump after draining to check oil pick ups, after confirming it runs ok for a little while once over filling oil level in engine.

Another thing that goes is the rail oil pressure sensor which reads incorrectly and a tell tale sign this is broken is the injector loom connector is full of engine oil when disconnected this is near engine oil level dip stick (wiring loom coming out of rocker cover).

The sensors reading can be checked with scan tool before starting with ignition on, (0-0.2MPa) it must read if its reading higher with ignition on only (motor not running) the sensor needs replacing.

The engine ECU needs to see approx. 200MPa when cranking to get injectors to start to work properly and higher when running at idle and beyond (up to about 5MPa at higher revs) if this is not getting to this or readings are fluctuating badly indicating air in oil the injectors wont supply the correct amount of diesel. In which the engine oil coming from low pressure (pickup pump) to then high pressure oil pump to rail and injectors.

#### **How to test the high pressure oil pump?**

Good day sirs, we are from the Philippines and we bought a 2nd hand Isuzu trooper with a 4jx1 engine, we had the trooper for almost 4 years now, the problem was the turbo, the impeller and its shaft was broken so we had it replaced, we drive tested it and after a few kilometers on the road (6 kms)

It emitted a white smoke, we towed the car and brought it home and contacted the supplier of the new turbo because it was again broken. So he came to see the car and tried starting it then he said that there was no oil coming to the turbo that's why it broke. What seems to be the problem?

A mechanic told us that it could be the high pressure oil pump, but he is not sure. This pump is expensive and we don't want to be gambling our money on this considering that we have spend so much money on this vehicle, rpcv, rps, turbo, injector you name it we have changed them all. Any help? Thanks

YOU should have a oil pipe at the top and another one at the bottom of turbo, now these are the feed top and the return the bottom pipe. Take off top pipe turn engine over, oil should come out. Now take off the bottom pipe and blow down it and you should hear the sound of air in side of engine If you have oil going in top and clear bottom pipe then you haven't any problems ..the turbo was no good. but change oil to 20w 50. IF YOU hadn't any oil pressure then the engine would have blown up at about 1mile from the start Turbo was no good to start with...

#### **White smoke and pressure in radiator.**

My 1998 3.0 DOHC (4jx1 engine) started pumping out white smoke. Before this happened the "check engine" light was coming on intermittently. On further investigation I noticed that there was coolant blowing out of the breather tube on top of the radiator expansion tank.

When I took off the radiator cap there was coolant blowing out of the radiator with some force and I assume in time with the compression stroke of one of the pistons. A mechanic friend of mine says that the engine is not worth trying to repair and that these engines are notorious for this type of problem!

He said that it could be the cylinder head gasket or the head but he suspects that the engine block itself has fractured due to the force that the coolant is coming out of the radiator. Just before this all happened I noticed that the heater would go cold and the temperature gauge would go to the cold side of the scale then go back to normal but it never indicated any temperature higher than normal. Any thoughts??????

Any sign of diesel in the water? Sounds like head gasket to me, the engine will rebuild ok but have the dealer put in new injector tube sleeves and O seals.

#### **No electricity from ECM to injector**

Hi Markq, Seems you may have a similar problem on your machine to the one we've had....The 4JX1 has taught us a lot we didn't know before, but specifically for this particular engine.

First I'll advise you check the obvious things...Make sure that your battery is charged fully. I'll explain why later.

Next make sure that there's no air in the fuel system.

On the filter housing you'll see a ten-millimeter bolt, which should be loosened and once loose push the plunger atop the housing to remove any air.

If bubbles come out you'll know that that was the problem or part of it.

With this particular engine the ORPS (sensor) gives the type of problems you're talking about. The sensor in question is fitted inside the tappet cover into the oil rail (which is the cylindrical pipe fitted over the valve assembly).

It has two sensors, one being the ORPS and the other being an oil temperature sensor. To get to these it'll mean removing the tappet cover which means first removing the inter cooler....then the oil feed pipe which fits into the side of the cover, Remove all the screws (five each side and three at each end)....The ORPS is the smaller of the sensors....It is a sensor which operates with a crystal.

The oil pressure pressing against it will cause a very small voltage, which is actually a pulsed signal.

That signal is sent to the management computer and controls the solid state switch, which allows the circuit for the injectors to become active.

### **Remember the battery?**

If the battery is not able to turn the engine at what you'll hear as a normal speed the oil pressure will not be enough to send the signal which opens the injectors.

The ORPS (Oil Rail Pressure Sensor) cost's about two hundred and twenty US\$ and if you do the job yourself you probably save a similar amount on labor charges....The engine oil is also critical....Only use the recommended oil....If that has not been used....

Buy double the amount of the correct oil and two of each filter....Drain what's there and then refill with the recommended oil (once vehicle is up and running) run the engine for thirty minutes or so (pref. on the road) and then re drain and again fit the other set of filters and refill.

We don't like the chemical engine flush additives, too dangerous, especially in a diesel engine....



## 21. Clutch:

The clutch on my Jackaroo has stopped working. The pedal went down without disengaging the clutch and having pulled the pedal back up it will no longer go down.

Master cylinder has correct level of fluid, no detectable leaks.

I've removed the inspection cover where the slave cylinder goes into the bell housing. The fork (on the outside) is against the pressure plate. It clearly isn't pulling(?) against anything in the centre of the clutch. The fork is pivoting normally on its pivot pin.

Having looked at the workshop manual, it appears the clutch is disengaged by the release bearing pulling the cover plate diaphragm spring. It seems that there is a breakage in whatever connects the release bearing to the diaphragm spring.

Am I on the right track? If so, can this be fixed without taking the pressure plate off - I can't work out what connects the release bearing to the diaphragm spring?

The clutch pulls at the centre of the pressure plate instead of pushing. Thrust bearing is held into centre by clip.

Is clutch engaged - do you have drive? Some things to try are:

- Open bleeder valve on slave and see if you can push pedal to floor and if this allows any movement at clutch fork.
- Also try removing slave from gearbox and see what moves. You will not get much movement at fork by hand.

AJ

The hydraulics are all working fine. The problem is the fork is not connected to anything in the centre of the clutch. If I push back the slave cylinder rod after removing the inspection cover, I can move the fork back and forth quite freely. The thrust bearing seems to have become disconnected from the pressure plate so it no longer pulls the springs and disengages the clutch.

How does the clip that holds the thrust bearing in the pressure plate springs work - is it possible this has broken and could be replaced?

I have found a video here of someone showing how the wedge collar, wire ring, pressure plate and release bearing work together in a pull type clutch. It looks from the workshop manual at 7C-14 that the Jackaroo clutch works the same way - is this right?

If so, it looks like I need to get a new wedge collar, wire ring and possibly release bearing. I will need to remove the pressure plate to install the wire ring on the wedge collar.

Hopefully I won't need to replace the pressure plate, which I am guessing would be horribly expensive.

Well I have finally removed the gearbox and disassembled the clutch. The problem is indeed the wedge collar. It has worn on the inside of the lugs where they contact the release bearing. Several lugs have broken along the wear line and the wire ring came off.

I finished the job today. In the end I replaced the wedge collar (Holden part number 8970650730 \$20) clutch release bearing (Exedy part number BRG2247 \$80 - this is the same as the original which must be made by Exedy) and pilot bearing (NSK 6203VVC \$5).

I replaced the release bearing mainly because the groove in which the wedge collar fits was badly worn which I believe would make the new wedge collar fail more quickly. Old is on left, new on right.

I used an ATV lift which cost \$115 plus freight with a wooden platform for the gearbox. I put a strap around the gearbox and jack to make sure it was safe and it was all very stable.

**Some tips which aren't in the manual in case anyone needs to work on a clutch:**

1/ I took the transfer case off to make the gearbox assembly lighter and less bulky. The connecting bolts are 14mm and you can't get a socket onto them so I used a ring spanner with the 15mm end cut off and a long tube over it to get more leverage to loosen the bolts. Consider getting one of those ratchet spanners, the bolts are fiddly and it helps a lot.

2/ I couldn't loosen the nuts on the front prop shaft so split it at the splines after marking both sides so it would be reassembled in the same alignment. This worked fine, the front half remained in place but didn't get in the way.

3/ The top bolts holding the gearbox to the engine can be reached from inside the car through the hole the gear change levers go through. The gearbox needs to be lowered a little to enable these to be reached. Take care not to lower too far or the intercooler will swing back against some pipes running along the bulkhead.

4/ It took some force to pull the gearbox off the engine. I used rope and pulleys around the rear axle and gearbox to pull it off.

5/ The engine needs some support when the gearbox is removed. I started with a jack under the sump and then put a block of wood between the rear of the engine and the chassis cross beam running under it.

6/ The pilot bearing is easy to get out with a pull hammer with a hook that fits through the hole in the bearing. Definitely worth replacing this as it is so cheap - I got an NSK one as it is identical to the original but it is a standard bearing so other makes could be used.

Many thanks to everyone, particularly Red-One for your help.

+++++

**Clutch Removal:**

Posted 17 November 2013 - 09:04 PM

Hi Tim.

Drop the back cross members and lower the engine/trans about 4-6" pivoting on the engine mounts. Best to undo the exhaust at the flange to avoid bending it. Watch the fan clearance to the radiator though. Then you can get at the bolts ok. It's well detailed in the manual. Be aware the engine weighs 260kg and the box is about the same - solid jack on firm footing eh.

The clutch has a "pull to open" release bearing. There's a little plate with 2 bolts on the btm/side of the bellhousing to stick a long screwdriver up and lever it out of the clutch centre before you drop the box. It's well detailed in the manual.

So, before undoing anything, drop the little plate and inspect. It sounds like your bearing may have unclipped itself for some reason. Perhaps the last person to work on it didn't clip it in properly. Maybe the bearing will clip back in with a screwdriver. Worth a try, maybe don't have to drop the box at all.

There may of course be damage to the fork or clutch fingers instead. But it's a very solid unit.

tim130, on 19 Nov 2013 - 5:41 PM, said:

Thanks Chilby. I have looked into the space and found that the fork is disengaged from the release bearing. The clutch was inclined to chatter, so I'm committed to replacing the major components. The parts will arrive in a few days. Then (given the weight of things) I will most likely have the clutch replaced in a workshop. Thanks again for your advice.

Tim

Hi Tim. I have a special jack for the tranny. Basically it's a plate that's adjustable for angle, with a chain attached to clamp the trans to it. It attaches to a trolley jack and the plate ends up high enough for the job if you have the Jackaroo up on front ramps.

I highly recommend something as stable as ramps when working with heavy components under a vehicle- axle stands etc are death waiting to happen. I see them on eBay still for \$150 with the jack. Additionally I have a 20 tonne truck jack that I use on my Mack with an overall height of 600mm, so that gets up under the back of the engine to lift and hold it all easily. I think the pneumatic over hydraulic type I have are also about \$150.

So for \$300 and a set of ramps it's quite straight forward. If doing this, mark all drive shaft locations prior to disassembly since they may have been balanced.

**Clutch – Dual mass:**

Clutch original is a dual-mass, recommended replacement is solid: Holden Jackaroo CLUTCH KIT & FLYWHEEL 3.0 Ltr Turbo Diesel 1998 Onwards EXEDY - Price: \$ AU 1,499.99

<http://www.exedy.com.au/clutch-finder>

## 22. Radio and Installation:

For future reference to make life a lot easier.

AEPRO make adapter harnesses for the Jackaroos to suit most common after market brands. Should be available from Autobarn or your local AEPRO stockists.

You can look on their web site for further info... [www.aerpro.com.au](http://www.aerpro.com.au)

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Here is my \$.05 worth.....1999 base model TD Jackaroo....

Go to Supercheap and buy APP062 harness adapter @ \$16.95. It is listed for Commodore VT onwards.

You use all of the wires except "ILLUM" and "MUTE". Solder all of the wires from the adapter to your head unit and heat shrink them. Put a cable tie around the adapter, as it doesn't lock in as the original.

You might want to wrap a bit of foam around the plug as to stop it rattling later.

Re the antenna control module (GM 92029494), remove it, open the back cover and solder in a link between terminals 7 and 8. Put the cover back on plug it back in, and each time you turn on your radio, you get FULL extension on your aerial. When you turn the radio off, the aerial goes down.

Whole job took less than 30 min. Nice Panasonic MP3/WMA player.

---

ANTENNA: 'selaga', on 18 Dec 2007 - 8:24 PM, said:

Re the antenna control module (GM 92029494), remove it, open the back cover and solder in a link between terminals 7 and 8. Put the cover back on plug it back in, and each time you turn on your radio, you get FULL extension on your aerial. When you turn the radio off, the aerial goes down .

OK - I found the self-same module in my 1997 SE - it is high up behind the glove box, bolted to the transverse tubular strut, which strengthens the body under the dash.

Hi all I hope someone knows how to do this I have had enough of the eurovox, so I have a pioneer DEH-P7850BT to install but I'm not sure about some of the wiring for the auto-antenna I have photo's and I'm hoping someone may know.

The Blue wire is from the pioneer. It is to go to Auto- antenna relay control terminal

There were 4 wires that came from the Eurovox In to the relay box on the jack

Yellow

Red

Blue

White

Now the red I believe is 12v back up

The Yellow is 12v

The blue is Antenna down

The white is Antenna up

The relay box shows 7 wires the pink an the gray go to the antenna and the black to earth.

Now the blue wire from the pioneer which wire do I connect it to

Geoff

---

Posted 14 February 2010 - 08:53 AM

Recently replaced my aerial with the Aerpro AP180, genuine no longer available. I see occasionally they are available on ebay but if I need to replace mast I can do so with the Aerpro mast AP12.

Here is the wiring diagram for the aerial control box located behind the glove box for those who want to keep it.

You will need to mount a momentary rocker switch available from Jaycar etc to control the manual up or down. Cheers

+++++

Pin number	Colour	Usage
1	(Black/Red)	Down control 12V momentary
2		
3	(Pink)	Aerial 12V continuous supply
4	(Red)	12V continuous supply
5	(Black)	Earth
6	(White)	Up control 12V momentary
7	(Grey)	Aerial 12V switch
8	(Green/Black)	Radio 12V switch

## 23. Cruise Control

Jackaroo SE 2000 Model 3L Diesel Cruise Control Installation - Command Aire AP 50 available from K-Mart

Provided by Trevor Mills

<http://forum.australia4wd.com/index.php?/topic/178-guide-to-installing-a-command-aire-ap-50/>

## 24. Tyres

265 /75 R16 is about as big as you can go and this, to my mind, is the ideal size unless you want to do some serious engineering or law breaking

## 25. Body Issues:

### Reduction of Drag

<https://www.buyairtab.com/>

Airtabs™ are patented, unique wishbone shaped vortex generators designed to increase vehicle aerodynamic performance and fuel economy by reducing aerodynamic pressure drag at two key locations. The tractor-trailer gap and the rear facing surface (the base area) of any commercial or private square backed vehicle or trailer that routinely attains highway speeds.

Drag reduction and fuel economy benefits from Airtab® application is not limited to commercial trucking operations. Airtabs™ enhance aerodynamic performance equally well on cube vans, straight trucks, expeditors, SUVs, RVs, buses, horse, toy and utility trailers, faired “bob tail” tractors, flat beds and tankers. The results may vary somewhat with vehicle type but the aerodynamic theory and principles are the same for all.

Each Airtab® creates two tight swirls of air or vortices that combine to reduce the suction and drag at the rear of vehicles traveling at speeds above approximately 35 mph or 55kmh. Airtabs™ are also effective at the rear rooflines of automobiles that have a rear window slope of greater than 30 degrees.

Airtabs™ offer several safety benefits as well. They improve vehicle stability by altering the airflow at the vehicle’s rear. The large random eddies at the rear surface are changed to an array of small vigorous “stream wise” vortices. The majority of users comment immediately on the improved vehicle handling performance, especially in gusty cross wind conditions or when passing (or being passed by) other vehicles.

This increases driver safety margins by reducing wandering and sudden adjacent lane incursions. Mirror visibility in rain or snow is also improved as the Airtabs™ help suppress precipitation and spray patterns. Safety is improved through better mirror visibility yielding safer lane changes as well as improving the visibility conditions for other road users.

By reducing the suction and aerodynamic drag at the rear of vehicles, the tendency to accumulate snow and road grime at this location is reduced. These help to improve corporate image and reduce cleaning time and expense. It also enhances safety by keeping conspicuity tape, tail and brake lights cleaner and helps the bottom line by reducing snow and weight build up in winter.



## 26. CASE STUDY – Uneven Idle

At the end of a reasonably long drive, during which it was stationary and idled well a couple of times, it started running roughly as I turned into a driveway. Starting a few minutes later the same thing happened. Once it gets above about 1000rpm it seems normal.

It doesn't feel like it's missing but the idle goes up and down a bit and occasionally drops very low, almost stalling. The fluctuations are quite irregular.

The ORPS was replaced in March last year so I'm hopeful that's not the cause, although of course it could be.

The first job, since it's so easy, is to check the fuel filter and housing for a blockage. I don't think that's the problem though, since it would affect high speed running as well.

What I would like to know is, could it be the oil rail PCV or the EGR valve? I'm trying to work through the simple things before allowing panic to set in...

Cheers

Rich

*I would check the fuel filter first. Just cos its rough on idle wont mean u will have problems up high as the extra pressure in the lines will help. Might be just some water in the fuel.*

*Couple of my simple points to do*

- 1. Check the fuel filter. If a bit of air comes inside the fuel line, you could have a rough idling*
- 2. clean inside TPS unit. Throttle should go very easy. Note: do not unbolt TPS!!!*

*Posted 23 July 2012 - 07:18 AM*

*No water or rubbish in the fuel filter, oil and both filters changed and the problem seems to have gone away.*

*As we know nothing 4JX1 fixes itself though, so as soon as I have time I'll look at the TPS (hadn't considered it before) and make sure the throttle is moving properly.*

*Cheers*

*Rich*

*G'day Rich,*

*My jack idled erratically a few years ago.*

*The flapper valve in the head of the fuel filter had pieces of rust and paint, which prevented it closing efficiently. From what I remember, it ran reasonably well when cruising, but difficult to drive smoothly at low speed in the lower gears; ie jerky throttle.*

*Had to ride the clutch a bit to keep it smooth*

The car went well for about 5000km before the uneven idle returned. As before, economy remained good, no loss of power, and above 1000rpm everything seems fine.

The oil pressure started dropping a bit low on occasion, but only when coasting with the throttle closed. Blip the throttle, pressure immediately returned to normal which is about 500KPa on the gauge.

The oil pressure thing seemed more like a sticky relief valve than anything else, a complete pain to fix if that's the case- it may not be a real problem anyway, see below. Anyway, off to the mechanic who agreed to drop the sump and check the oil pickups before doing anything more serious.

The pickup seals were extremely hard and cracked in a few places but it didn't seem there was any major problem yet. The mechanic checked everything with his scan tool, no codes and the oil pressure sensor is not registering the low pressure that shows on the gauge. He did notice the TPS voltage was low at idle. That made him suspicious of the input voltage so he checked the alternator output and bingo! It dropped from 14.1V at idle to 12.1V and then recovered after a little while. The uneven idle started when the voltage dropped and it smoothed out when the voltage went back to 14.1.

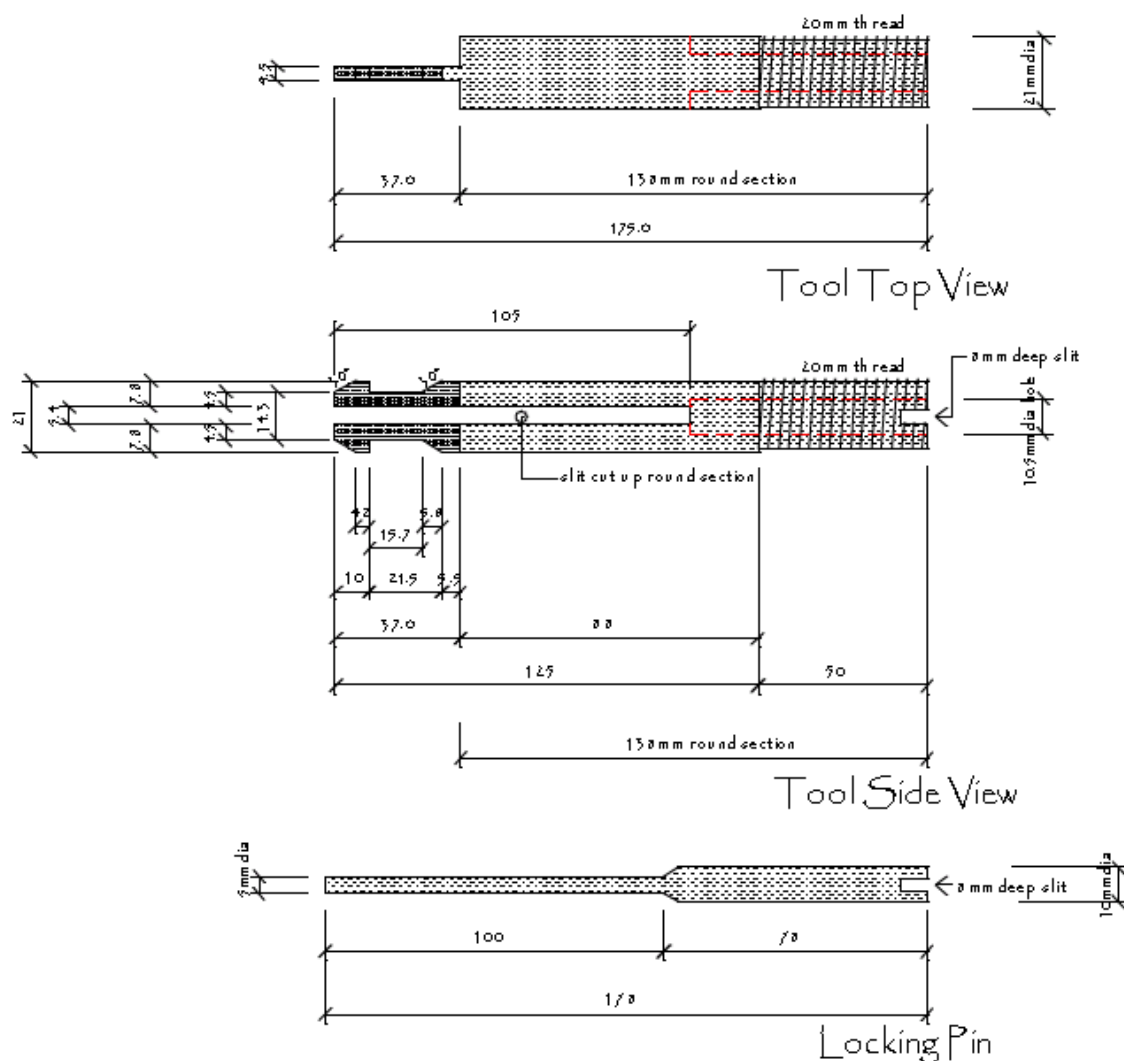
He adjusted the TPS to give the correct voltage at idle (I think he said 4.9V but can't remember for sure) and I drove it home. The idle is still uneven most of the time and the idle speed is slightly lower than before.

So that's where it stands right now. Next week I will get it to an auto electrician to have the alternator checked out. Tune in then for the next exciting installment...

Cheers

Rich

## Sleeve Puller Tool – Chilby



### Re Tool Fabrication

Discovery after much research... ordinary "1/2" galv water pipe... is in fact 21.3mm OD > a smidge too large. However if you get a "1/2" BSP" die, the tread cuts to 20.955mm OD...

This gives a 1.8 thousands of an inch clearance fit in a 21mm bore and is the perfect size for the tool body without machining. Personally I'm circular grinding my tools, but the die cut thread should still work a treat.. ( I'd like mine to be pretty though ).

Further, "3/4" BSP" water pipe nests over 1/2" and is perfect for the press sleeve. It has a 26.9mm OD and an ID bore of 21.7mm - perfect for the outer sleeve.

All this stuff can be bought at a hardware shop. Mind you a lot of the small stores don't stock gal. pipe now but you can order it in. Since you only need 178mm length overall for the tool... you likely have a bit in your metal bin in the shed.

In the end I'm not using pipe sections for my tool however. I'm welding thickness of MS together then welding and precision grinding. The jaws are actually the hard bit to do since they're quite tiny but the shape has to be perfect to the drawing or they either won't lock in the fuel holes of the sleeve properly. If not, will stick out too far once locked and wreck your aluminium head as you pull the sleeve - a very expensive fault. I might be making 5 of these so be selling 4 once I have them working well in case you can't be bothered setting up machinery.

It occurs to me that the body of the tool may need to be heat treated to retain the ability to spring back to normal shape after having been locked - the only way to tell is to make one. The jaws should never be hardened since that could scour the sleeve bore. Many bugs to fix... Keep you posted.

Edited by chilby, 10 January 2013 - 03:45 PM.

## Vehicle GVM + LOADS:

Re: JACKAROO 'stuff'... « Reply #63 on: January 20, 2014, 05:54:55 PM » For those interested in GVM, towing capacity of Jackaroo's, here is the good oil from my manual... and so I can find it when I need it.

### Kerb mass

The weight of a standard unloaded vehicle with a full tank of fuel. :D

Petrol LWB

Manual: 1865KG Auto: 1885kg

### Diesel

Manual: 1995 Auto: 2115kg

G.V.M. Gross Vehicle Mass (G.V.M.) is the total weight that a vehicle is allowed to weigh when fully loaded. This must include luggage, passengers, a full tank of fuel and tow bar load.

The maximum allowable G.V.M. is: SWB 2500kg LWB 2600kg

### Towing capacity (State regulations permitting).

Un-braked 750kg

'Over run' trailer brakes 750kg - 2000kg

Driver actuated with 'break away' capacity 2000+kg - 2500kg (MAX.)

G.C.M. Gross Combined Weight (G.C.M.) is the maximum allowable combined weight of vehicle (with passengers, fuel, luggage, etc) plus the weight of a packed trailer.

The maximum allowable G.C.M. is: SWB 5000kg LWB 5100kg.

### Front and rear axle loads

Max allowable front load 1250kg Max allowable rear load 1400kg

However, combined front and rear axle load should not exceed maximum G.V.M. [2500 / 2600kg]

Remember to take the tow bar ball weight into account when determining the rear axle load.

So, my 2002 Equipe (LWB) auto petrol dual fuel has the following figures, factoring in loaded Heaslip camper, with overrun brakes: GVM 2600kg - Curb mass 1885kg = 715kg for passengers, luggage, and 'modifications / equipment' (including net increase for dual fuel system).

GCM = CVM 2600 + Heaslip camper 1000kg = 3600kg

Front axle load: aim at 1200kg (with alloy bull bar and dual battery, no winch)

Rear axle load: aim at 1400 kg (i.e.1300kg with rear shelving system PLUS 100kg tow ball weight i.e. 10% of 1000kg trailer). So:

System	Weight
Dual fuel system	80kg???
Alloy Bull Bar	50kg???
Driver & Navigator	200kg
Rear racks & shelves	50 kg
Alloy roof rack	20kg
Full fridge	100kg
Mallee tracks	20 kg
Tools	20 kg
Recovery Gear compressor etc	30kg
Food etc	60kg
Water	40kg
4 x 10 litre half Jerry cans	40kg
TOTAL	710kg

The above figures, (tow ball weight excepted) would apply to travelling 'bob-tailed' i.e. no trailer.

Additional food water gear, etc could be carried in trailer, weight limits permitting.

(Axle is rated to 2000kg, as are brakes.)

Perhaps the 'ideal' would be to have the 'roof' rack mounted on a 'boat' rack on the trailer, this would:

- \* Reduce GVM of the car;
- \* Provide for better ergonomics when loading the rack, and, subject to location of the rack above the trailer axle; allow for increase in trailer loaded weight with little or no increase in tow ball load. ;D

OK, looks like I have a 'plan' for the "Lap Rig"! 8) « Last Edit: February 16, 2014, 08:35:41 PM by B&B »

**Manifold blocked:**

<http://forum.australia4wd.com/index.php?/topic/27019-map-sensor-and-surge-under-acceleration/>

husq3092, on 24 Mar 2013 - 04:33 AM, said: Hi,

I have tried to find a solution to this issue I have with my Jackaroo 4jx1.

The check engine light comes on intermittently and only while under acceleration, when I back off, say slowing down for a corner, the check engine light goes out. When the check engine light is on it does not surge but is under powered, when the light is off it surges like a miss in a petrol engine. Hot or Cold.

I have changed the MAP, TPS sensors ( I changed these as they were indicated as faulty via MIL codes). I had an oil leak in the rocker cover gasket so when I changed that I also changed the OPRs sensor and main wiring harness. All sensors are new.

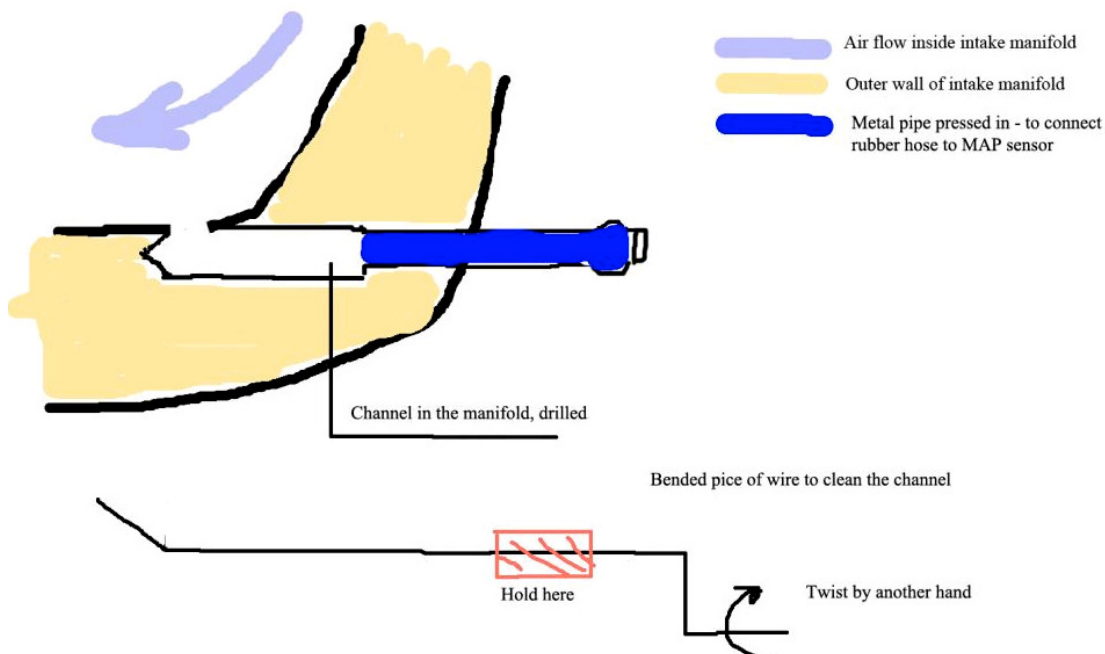
I have also changed fuel and oil filters(delco) and run penrite 5w oil. Any assistance would be greatly appreciated. thanks

Check the hose from MAP-sensor to the manifold and the channel in the manifold. Try push in a piece of wire or something like this, this channel could be blocked by deposits of carbon.

Check that new TPS sensor is adjusted correctly.

Try genuine oil filters

Disconnect a battery for a few hours, to clean the MIL-codes from memory. Drive car a day more, than read possible MIL-codes with paperclip. Cheers Sergey





## 27. Parts List:

I have not checked all these yet, but updating as I go.

Description	Brand	Part No	
Main Oil Filter	Isuzu	8971-679-720	
	Ryco	Z600	<b>Do not use</b>
	Nippon Max	MO-024	
	Wesfil	WZ554	Neil @ Sydney
Secondary Filter	Ryco	Z79A	<b>Do not use</b>
	Cooper / Wesfil	WZ79	
Air Filter	Wesfil	WA1081	
	Ryco	A1081	
Fuel filter	Sakura	FC-1301	
	GM	8943-935-211	
	Isuzu	8943-940-790	
<b>Gasket, seals etc required for installing injectors &amp; sleeves</b>			
Injector body O-ring (x4)	Isuzu	8972-407-980	
	GM	9724 0798	4
Injector to oil rail O-ring (x4)	Isuzu	8971-757-830	
	GM	9717 5783	4
Copper washer for injector tip (x 4)	Isuzu	8971-611-092	4
High pressure oil pipe gasket (x2)	Isuzu	8971-842-160	2
Injector sleeve top O-ring (x4)	Isuzu	8972-407-970	
	GM	9724 0797	4
Injector sleeve bottom O-ring (x4)	Isuzu	9095-661-190	
	GM	0956 6119	
	GM	9401 1699	4
Injector sleeves	Isuzu	8971-	
	GM	9720 4076	
Throttle Body gasket	Isuzu	8971-378-200	
	GM	9713 7820	
Fuel injector	Isuzu/ B/M	8971-925-963	
Injector wiring harness	Isuzu		
	GM	8971 463 368	
Rocker Cover Gasket		9716-0672	
<b>Oil Rail control &amp; sensor</b>			
Oil Rail Pressure Sensor - ORPS	Isuzu	8971-370-421	
	GM	9713 7042	
ORPS 'O' ring	GM	8971-865-720	
Rail Pressure Control Valve - RPCV	GM	8971-748-720	
Injector wiring harness	GM	8971-463-368	
	Isuzu	8-97146336	
<b>Front Axle</b>			
Front axle oil seal	GM	8980-365-940	
Front axle bearing lock screw (x3)	GM	8978-101-070	
<b>Rear brakes</b>			
Rear brake guide pin type A	GM	8943-628-210	
Rear brake guide pin type B	GM	8974-160-210	
Rear brake guide pin boot	GM	8943-628-230	
Rear brake pads	Bendix	DB1280	
Parking brake shoe	Beck/Arnley	081-3237	
Mainifold Air Temperature sensor - MAT	GM	8121-468-830	
Manifold Air Pressure sensor - MAP	GM		
Intake Throttle Position Sensor - ITPS	GM	8973-728-510	
Glow plugs (x4)	Glow Plugs Aust	CPI-026	
	SMS Diesel	PI-172	
	BOSCH	GP1026	
	HOLDEN ISUZU	8-97143674-1	
Steering idler arm	Pedders	PSX9710	
<b>Alternator</b>			
Drive belt (x2)	BOSCH	11A1005	
Bearing		BEX4000	
Bearing		6303	

